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HOPE FOR THE FUTURE

No. 30
JULY 1983

anticipation

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CHRISTIAN SOCIAL THOUGHT IN A FUTURE PERSPECTIVE

The occasional study journal of the Sub-unit on Church and Society of the World Council of Churches

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FOR FURTHER INFORMATION ON THIS ISSUE PLEASE CONTACT :

World Council of Churches
Sub-unit on Church and Society
150, route de Ferney
CH - 1211 GENEVA 20
Switzerland

Telephone : (41-22) 98 94 00
Telex : 23 423 oik ch
Cable : OIKOUMENE GENEVA

EDITORIAL NOTE

With this number of *Anticipation* No. 30, we close a period of ecumenical examination of the issues of faith, science and technology which began in 1969. After the first stage (1969-1975) on the theme: "The Future of Man and Society in a World of Science-Based Technology", the World Council of Churches' Assembly meeting, December 1975, in Nairobi, Kenya, urged the continuation of the programme. This led to a second stage on the theme "Faith, Science and the Future", featuring a World Conference on that topic at the Massachusetts Institute of Technology (MIT), in July 1979, and culminating in a two-year follow-up discussion in the Churches. The Sixth WCC Assembly in Vancouver, Canada (July 24 - August 10, 1983), has now to evaluate this work and determine whether the World Council should continue its interest in the area of science and technology and if so, what might be the thrust of its further work. The articles in this issue are intended to inform the Assembly, and our worldwide network of collaborators, of the latest materials from the sub-unit on Church and Society reflecting the continuing discussion in the churches on the issues of Faith, Science and Society.

It is too early to make a substantial assessment of the final results of the MIT experience and all that flowed into and from it. Two recent books by two of our close collaborators in this work, Roger Shinn and Charles Birch, briefly reviewed in this issue, illustrate the ever widening ecumenical interest in the subject of Science and Technology. Indeed one of the problems of the churches is to keep abreast of the immense flow of material on the ethical and social consequences of the social changes promoted by science and technology. One of the lessons of the WCC programme is that the churches of the world are, generally speaking, almost totally unprepared for this task. Yet ecumenical work on science and technology (1975-83) also makes clear that the social and economic changes it brings are spreading all over the world and the process will continue at an ever accelerating rate.

With this in mind the Working Committee on Church and Society, meeting in Bigorio, Switzerland, June 7-13, 1982, made a number of practical recommendations to the Central Committee of the World Council of Churches concerning the scope and purpose of future programme in this area. Their report is being forwarded to the Assembly in Vancouver for consideration, and it is in that context that it is published here. Some Christian groups in different countries are actively pursuing these concerns, in different ways, and we include in this issue several significant statements and reports.

— In France a group of economists, sociologists, theologians and technologists, Protestants and Roman Catholics, have been working together on a document entitled "Call to Men and Women of Hope", with particular reference to developments up to the year 2000. The statement of this study group, convened by the Ecumenical Centre of Villemétrie, near Paris, has been published with the commendation of Monsignor Jacques Ménager, Roman Catholic Archbishop of Reims and President of the French Commission on Justice and Peace; Monsignor Joseph Rozier, Bishop of Poitiers, and President of the Social Commission of the French Episcopate and the Rev. Jacques Maury, Pastor and President of the Protestant Federation of France and member of the Central Committee of the World Council of Churches.

— In his article, "Nuclear Energy Revisited", Janos Pasztor, Consultant to the sub-unit on Church and Society for the Energy for my Neighbour Programme, reviews the inter-Assembly debate about nuclear energy and the situation after the moratorium on nuclear energy voted by the Conference at MIT (1979) and later endorsed by the Central Committee of the WCC in 1980 (in a close vote). Janos Pasztor leaves the WCC staff in September (1983) after four years of most fruitful service. It has been a joy and privilege to work with him.

— The article, "Jobs, Technology and Alternative Planning" is by Dr. Howard Davis, a newcomer to the ecumenical study scene. He is the newly appointed Director of the well-known Society, Religion and Technology Project of the Church of Scotland which began in 1970, one of the first efforts by a Church to enter seriously into the debate about faith, science and society. Dr. Davis is an industrial sociologist and is particularly interested in the social consequences of the new social/industrial revolution resulting from the growth of computer power and micro-processor technology. His article is part of a recent discussion folder produced for use in the Scottish Churches.

— From the debate about the future in Eastern Europe we reproduce a radio interview with Hungarian economist József Bognár, director of the Hungarian Academy of Sciences' Research Institute for World Economics. His thoughtful responses to the question "Will the World Make the Year Two Thousand?", may not otherwise reach many of our readers.

— The debate about evolutionary theory has been revived in large part by the challenge of "creationist scientists" to the modern versions of Darwinian theory. In his article, "Did Darwin Get it Wrong?", Charles Birch, Challis Professor of Biology at the University of Sydney and vice-moderator of the Working Committee on Church and Society, reviews the attacks on evolutionary theory and suggests a role for Christians.

In one of the liveliest post-MIT Conference meetings, in Jos, Nigeria (June 1981), the Working Committee of Church and Society met with a group of 12 African scientists, technologists, philosophers and theologians to discuss science and technology in its encounter with African culture and society. One of a speakers, Dr. K.C. Anyanwu, lecturer in Philosophy at the University of Lagos, presented a paper on "Faith, Science and the Future: the African Context". His fully developed paper has been substantially shortened for publication here but we trust it still conveys the urgency with which he views the great conceptual and practical ambiguity accompanying the rapid introduction of modern science and technology in African culture and the need of the Africans to scrutinize the mess of technological pottage they have been too readily persuaded to buy.

Meanwhile, in India, the New Delhi Centre for Science and Environment has published a Citizens' Report on the "State of India's Environment" (1982), which has stirred up much interest in India and throughout the world. We reproduce here the "Statement of Shared Concern" with which their report concludes.

As already mentioned, two books by several faithful collaborators in ecumenical work on Science and Technology have richly added to the literature available to churches on hopes for the future. We are pleased to give them special mention.

* * *

Future issues and reports coming from Church and Society will be coming to you from the new management. I have been grateful for your help and support over 34 years with the World Council and I shall follow with undiminished interest the progress of the further ecumenical encounter with these critical issues.

Paul Abrecht
Geneva, June 17, 1983

THE PROGRAMME OF CHURCH AND SOCIETY 1976 - 1982 AND PROPOSALS FOR THE FUTURE

Report and Recommendations of the Working Group

INTRODUCTION

The sub-unit on Church and Society has concluded the programme of ecumenical study and action on Faith, Science and the Future begun in 1976 in accordance with the mandate given it by the Nairobi Assembly. This programme has now to be evaluated by the churches at the Vancouver Assembly. At the same time the Assembly must determine the general lines of the future work of this sub-unit. In preparation for this review the Working Group offers the following observations:

1. The programme on Faith, Science and the Future, including the meetings and consultations, leading up to the 1979 World Conference at MIT and its follow-up, has made a substantial contribution to ecumenical thought and action in this period. The extent of this has been spelled out in the reports and publications resulting from the programme. (For a list of meetings and publications see Appendix, p. 11). They have established the WCC as a serious participant in the ongoing worldwide debate and assessment of the benefits and risks of modern science and technology.

2. The methods of study and consultation used in the programme have been effective in: revealing the critical issues; securing a substantial contribution from the scientific community; making possible successful interdisciplinary conversation between scientists, theologians and lay people; helping the ecumenical movement make difficult choices based on a serious examination of the ethical, social and technical criteria.

The importance of systematic monitoring of new developments in science and technology, e.g. in energy, biology, military technology, etc. and of the social and ethical consequences has emerged as one of the essential tasks for churches in the future.

3. There is ample justification for continuing ecumenical attention to these issues. The discussion of science and technology is more and more accepted as part of the larger ecumenical witness on social responsibility although many churches lack the appropriate structures for effective participation. Lay people, including scientists and technologists often have to make their contribution without the support of their churches. Young people, including science students, feel especially left out of the discussion in the churches. Some churches do not accept the concern for science and technology as a priority although modern science and technology-based development confronts them with immense and unavoidable social and ethical problems. It is time that both the churches and the technical experts realize that neither alone can cope with the complex issues raised.

4. The coordination of the Church and Society programme with other programmes of the WCC has been a matter of constant concern. Since Nairobi there have been three specific instances of effective cooperation between Church and Society and other WCC sub-units: (1) the Consultation on Political Economy, Ethics and Theology, Zürich, June 1978, organized jointly with CCPD; (2) the World Conference at MIT in 1979, which involved close cooperation on questions of procedure, programme and finance; (3) the Public Hearing on Nuclear Weapons and Disarmament in Amsterdam, in 1981, organized jointly with CCIA.

REVIEW OF RESULTS IN FOUR CRITICAL AREAS

We draw attention to four critical areas of our work since Nairobi, which are relevant to the Vancouver Assembly theme, *Jesus Christ, the Life of the World*, and to the Assembly issues. All present important concerns for future ecumenical work.

I. Science and Faith

Consideration of the relationship between Science and Faith has been pursued in Consultations in Mexico City (1975), Cambridge, UK (1977) and Zürich (1977); in two sections of the MIT Conference (1979) and in the meetings of the Working Group in Stuttgart (1980) and in Bigorio, Switzerland (1982).

We have dealt in these meetings with various aspects of the worldwide social and cultural crisis brought about by the intensive application of science and technology, and the way this affects the centuries old debate about the relation between science and faith.

1. The Theological-Ethical Challenge Resulting from the Use and Misuse of Modern Science and Technology

Science and Technology have claimed to offer a complete view of "reality" and the solution to almost all human problems. In fact they have created immense new spiritual and social dilemmas. The chief problem areas are:

— *Science and Technology as Power over Society.* The perpetual interaction of science with reality is what makes technology possible. It produces a planned transformation of the world. The actor and the field of his/her action are inseparable here. At this point "reality" must include the limitations of the actors and the socio-economic constraints upon them, as well as the underlying natural laws. Hence the scientific view of reality requires more not less precision and honesty in thinking. Sometimes this leads scientists and technologists to shy away from any involvement in broader question. But they have to admit that the results of their work can and often are used by those whose moral and quality standards they detest. They should admit that the crisis of science and technology as power cannot be solved by insistence on

scientific purity and by abstaining from the discussion of social goals or from engaging in political-social struggles for control.

— *The Cultural and Social Situation Created by the Contemporary Power over Nature.* In the words of the MIT Conference Report:

> "The cultural context has radically changed since biblical times. In the biblical period humanity was confronted with an overpowering nature. The command to rule the animals and to subdue the earth delivered people from fear and from the temptation to divinize or demonize nature and encouraged them to overcome suffering and to build culture. The power relations have since been reversed by science and technology. A desacralized nature is in the power of humanity which is now able to destroy its own species and perhaps even all life on the earth. Our own technological inventions and our social process are threatening to get the upper hand and to become as overpowering as nature once was. What needs to be emphasized today, therefore, is the *relatedness* between God and his creation rather than their separateness. The dignity of nature as creation needs to be stressed and humanity's *dominium* must be bound up with our responsibility for the preservation of life." Admittedly, "the situation of the rich countries of the earth is completely different from that of the poor countries. In the rich countries nature has been so thoroughly reshaped that humanity lives in an artificial world, whereas in the poor countries it has not yet been sufficiently adapted to human need and there is still much work to be done (although not necessarily in the pattern of the rich countries)." (2:33)

— *Science and Technology as Movements of Liberation — and Oppression.* Science and technology have been and continue to be movements of liberation from physical want and natural forces. But any liberation movement tends to turn into a new oppression if the spirituality and ethics of redemption are not at work in it, liberating its creativity from new forms of idolatry and destructiveness. The theological framework of creation, fall and redemption is essential for our understanding and response to the enriching and tragic elements in the situation created by science and technology.

— *The Inadequacy of Science and Technology as Symbols of Meaning and Hope.* The MIT Conference noted that:

> "Faith and Science both depend on metaphorical and symbolic linguistic elements. Science and technology no longer sustained by an optimistic belief in progress, need especially symbols of meaning and hope which set their programmes within a horizon which provides both meaning and direction." The Christian view of God as Creator and his goal for his creation provides such meaning and direction. The term creation in this context includes "both humanity and nature and the disciplines which study them, whether the natural or social sciences or the humanities". The purpose of God for creation "cannot be deduced from scientific view of nature but only from our knowledge of God in the history of Israel and through Jesus Christ".

2. False or Incomplete Answers — and their Philosophical Roots

Many false or incomplete answers are being given to these problems. Some of these were described in the Consultation on Nature, Humanity and God (Zürich 1977):

i. The "Science will handle it" answer. Technological optimism is still widespread today. It sees the solutions to most social problems as technological. According to this view, there are no limits to human intervention in nature.

ii. The "Return to Nature" answer. The call for total de-industrialization and a return to a simple rural culture implies that science and technology have become and will remain evils.

iii. The "God will provide" answer. Without effort on our part, through divine intervention, things will work out.

iv. The "Doomsday" answer. It is too late to do something. We can only wait for the end.

v. The "Life-boat Ethics" answer. The nations are divided between those in the boat and those struggling in the water. If the people in the life-boat let those in the water clamber on board everybody will drown. Better that some are saved.

vi. The "Scapegoat" answer. Capitalism or Communism or some other ideology is solely responsible for the problem.

vii. The "We'll cross the bridge when we come to it" answer. This is the attitude of many people: we must hurry to catch up with others; we'll worry about the effects of technology later.

Underlying these false or incomplete responses to the present crisis are certain obviously false or incomplete views of nature, humanity and God.

i. *The "pragmatic view".* Don't worry about the meaning behind things. There are too many conflicting views about meaning for agreement to be possible. Get on with the job and leave the theory to look after itself.

ii. *The "mechanistic view".* This is the prevailing view. It is implicit or explicit in the thinking of many scientists and is generally taught to students and propagated in the popular press. According to this view living organisms are mechanistic contrivances. In an extreme version, it leads to statements such as the following by a well-known astronomer, "The more the universe is comprehensible the more pointless it seems to be". Alternative models are being developed within science and philosophy but these have as yet had little influence among scientists or those they teach.

iii. *The "compartment view".* Science and religion deal with two distinct areas. The knowledge we derive from each can be kept in separate compartments, with little or no traffic between them.

iv. *The "religious fundamentalist view".* The Bible or some other scripture, literally understood, is scientifically authoritative and provides the criteria for accepting or rejecting the findings of modern science. One example of this view requires rejection of evolutionary theories of human origins, claiming that these conflict with the account in Genesis.

In the course of our many discussions of these "incomplete or false answers" to and views of the problems of science and technology, we have begun to outline the characteristics of a more comprehensive view of reality and to discern the implications of this for the relation between science and faith today.

3. The Complementary Contributions of Science and Faith

Science has developed through interaction with the world it studies. It has always used basic assumptions which it has modified, and sometimes abandoned, in the course of successive scientific breakthroughs. These are often shocking and can cause great trouble; but they are in the end philosophically constructive. For instance, the new way of thinking which Darwin offered did not, as was at first feared, prove pernicious either to conceptual order or to religion. It called for deep rearrangements in the

structure of our thought and this task is by no means finished. We cannot return to the simpler world-view of our ancestors. When properly understood, Darwinism is not reductive. It gives a descriptive account of the probable history of life, which neither competes nor conflicts with a sensitive view of its meaning and importance. (The impression of sharp conflict, which is still widespread, is due partly to religious dogmatism, and partly to the persistence of "Social Darwinism", a misuse of the biological theory to justify social exploitation.)

If science seeks precision in rational description and comprehension of reality, the Christian faith demands decision to accept Christ as central to the meaning of reality. This also expresses the limitation of faith as well as the fact that it is not in competition with science. In spite of the non-competitive nature of the two approaches to reality throughout history, both science and faith have failed to respect their mutual boundaries and have sometimes entered into a battle to monopolize the approach to reality. This has produced the arrogance of religious dogmatism on the one hand and of scientific dogmatism on the other.

Mutual opposition and epistemological dualism characterize much Western thought: subject and object, matter and spirit, knowledge and belief, intellect and feeling, the whole and the individual — these are often set over against each other, in theology, in philosophy and in science. (II, pp. 29 ff.)

Humanity and nature have also often been seen as two separate realities. In thelogy, for example, salvation in Christ has been seen as affecting humanity, but not nature. Creation and Redemption have been two separate doctrines. In science, humanity has been subject, knower and transformer; nature has been object, to be known and transformed.

The ecological crisis, as well as twentieth century developments in science, force us today to a more inclusive view seeing nature with humanity as an integral whole with internal differentiations and interactions — the one shaping and shaped by the other. This has led to many intellectual and spiritual trends. A romantic return-to-nature movement, Whitehead's process thought and the dialectic view of man and nature in Marxist thought are obvious examples.

There is also a growing interest in the more integral vision of Taoist, Buddhist and Hindu thought, as well as in the classical Eastern Christian view (e.g. Gregory of Nyssa) which emphasized divine-human unity in Christ, and taught the integral relation of humanity-nature in itself and to God, without denying the transcendence of both God and humanity.

In the development of the physical sciences there has been no necessary denial of the Christian doctrine of creation by God or of the contingence of both humanity and nature on God's will and purpose. These doctrines have nevertheless been conveniently ignored or disregarded, as playing no role whatsoever in the scientific enquiry and method — even by many scientists who sincerely believed in God and held firmly to these doctrines of faith. The development of science was hampered in its beginnings by religious authority. The struggle for emancipation from such authority, seen as necessary to the development of science, resulted first in the separation between the realms of the secular and the religious, and then in the declaration of autonomy by the secular. Social institutions for education, health and government were secularized. Religion soon became a private affair, confined to the home and to the Church and its institutions.

Modern science and the technology based on it, with their impressive achievements, soon dominated civilization. They were eagerly sought and pursued by newly independent nations striving to overcome the problems of poverty and "backwardness". Scientists and technologists "were adulated as the high priests and magicians of a progressing technological society" (II, 9). The secular civilization thus formed in the West, along with its secular institutions, soon spread to other continents and cultures previously shaped by other religions.

There have been some recent attempts to re-establish religious authority over science and technology, notably in certain Islamic movements such as in Iran, and in Christian fundamentalist movements like Creationism in the USA. Christians generally regard such movements as unfortunate and misguided. Neither religion dominating science nor science dominating religion is considered acceptable.

And yet many thinking Christians are unwilling to leave religion and science as two distinct and non-intersecting approaches to the same reality, or as distinct ways of dealing with two separate realms of reality, or even as two different non-conflicting language systems. They have a genuine desire to reach the deepest level of understanding, to seek an integrative framework which would not preclude by future discoveries and insights, in either science or faith. Of course, any integrative framework can only be provisional, helping us for the time being to find our way forward.

It could be a fatal error to presume that, at the deepest level, perceptions of reality can be exclusively conceptual or expressible in any given or made-up language. Conceptual perceptions and linguistic statements can at best be no more than road-maps to reality. And it is in quest of such a road-map that the following statement is made.

The Christian Affirmation

Christians affirm today that all reality is ultimately one — not two, or three or many. But within that one there can be distinction and difference. Thus Christians affirm that God Himself (or Herself) is Three in One — not three separate beings, but three persons in One Being, not spatially extended, not time-bound, without beginning or end, without finite limits. We also affirm that this God is not to be located either within or beyond the universe in a spatial sense. Such statements have to be immediately qualified by the affirmation that they are only the expressions of our feeble conception and language, which do not do justice to the ultimate incomprehensibility of the divine mystery of God's unique is-ness or form of being. Any conception and statement possible for us suffers from the defects of an inescapable time-space perspective. If we say He is the "ground" of our being and of the being of the universe, we are resorting to a spatial metaphor. If we say He is the origin or source, that too is temporal and spatial language which is not fitting.

Christians affirm that the universe is created by God. This too is a humble confession in our imperfect language. We mean by this that the universe is not self-existent, but other-derived, that its existence is contingent on God's will, that God sustains and guides the universe, that God leads it on to its destiny. These are confessions — not scientific statements to be empirically demonstrated.

But even our imperfect confessions need re-examination and constant correction. It would be wrong, even within the limits of our conception and language, if we were to imply by our confession of created-ness, that the Creator and the creation are two disjunct and separate realities. We should not understand God as somehow outside the universe, nor the universe as "outside" God. To do the former is to imply the latter, and to do the latter is to posit an "outside" to God implying a finite boundary to the infinite God.

If we say that we and the universe are not outside God, are we then saying we are "inside"? That would be to imply a spatial extension in God, which we cannot and do not concede.

It is thus clear that the logic of non-contradiction cannot cope with either the is-ness of God or with the location of the universe and God in relation to each other.

What then do we affirm?

i. We affirm that God is the origin, ground and destiny of the universe, acknowledging that the doctrine of creation is neither conceptually transparent nor empirically testable.

ii. We affirm the "non-picturability" of God, the Universe, and the God-Universe inter-relation.

iii. We affirm also that while the Creator and creation are conceptually and qualitatively distinguishable, the creation cannot exist without or outside the Creator.

iv. Because the creation cannot be outside the Creator, or the Creator outside of creation, we affirm their ultimate unity without denying the distinctions.

v. Above all, the ultimate destiny of the universe is for all things to be reconciled in Christ, Christ being united with the Father and with the universe.

What practical consequences do these affirmations have?

i. Humanity has to recognize the two poles around which and between which its life develops and evolves — the Creator and the Creation. The attempt to ignore one of the poles has already resulted in disastrous consequences. This should be a key issue on the agenda of an in-depth science-faith dialogue.

ii. Science/technology should be faulted not only for its ignoring of one pole (the Creator) but also for its separating humanity and nature as two distinct realities (subject-object, knower-known, manipulator-manipulated) and for its conceiving itself (at least in its aspect of pure science) as value-free. These faults, however, cannot be fully corrected without reference to the ignored pole — God. The scientific community as a whole at the moment shows no readiness for this. Is there a group of Christian members of that community willing to explore the possibilities here, with the assistance of philosophers, theologians, and perhaps thinkers of other religions?

II. Science and Technology in Society

1. Technology, Justice and Sustainability — Aspects of the Present World Situation

Every effort for social justice in our time runs the grave difficulties caused by the world economic situation. In the period following World War II the world experienced 25 years of economic growth unparalleled in all history. Yet that growth, even though accompanied by some major efforts to encourage economic development in less developed countries, did little to help the world's poorest people. Growth of wealth increased the distance between rich and poor; sometimes the poor actually lost ground as the rich grew richer. It happened within nations as well as between rich and poor nations. Too often the rich were becoming richer by making the poor poorer.

In many societies an increasing gross national product has been accompanied by increasing unemployment, making ironical the argument that the answer to unemployment is a further increase in production. Theories of a trade-off between unemployment and inflation have given way to stagflation — involving simultaneously unemployment and inflation. Even so, the dominant voices still argue for greater production as the answer to poverty and unemployment.

The most recent blow to the confidence that rising production would eventually lead toward benefits for all has come with the awareness that the world has embarked on an economic process that is unsustainable for a long future. Economic activities are using up unrenewable resources, consuming renewable resources at rates faster than their renewal, and polluting the environment in ways that threaten human life and health, and ecosystems.

To poor people and nations this is an intolerable message. They have long heard the story that rising production would eventually benefit them. Now they hear that the rising production must slow down or stop before it can reach them.

The new ecological awareness seems, to some people, to throw justice and sustainability into conflict with each other. In this reading of the situation sustainability requires something like a steady-state economy while justice requires economic growth. The contended people of privilege might be ready to halt economic growth, perpetuating the world's inequalities, while the poor demand more jobs and more goods.

But a different reading of the situation is more persuasive. Firstly, ecological hazards hurt the poor most of all, a point emphasized by "Third World" participants in the second United Nations Conference on Environment (Nairobi 1982). Soil erosion, desertification, starvation and pollution threaten primarily the poor and powerless. Scarcities and rising prices, more inconvenience to people of wealth, are disastrous to impoverished people and nations. Secondly, this understanding of things sees the increased urgency of justice. So long as rising production offered an illusion of coming wealth for all, the demands of justice could be subordinated. When the illusion is exposed the necessity for the redistribution of wealth and power becomes evident.

In the frustrating world situation one temptation is to reiterate old economic dogmas. In all societies ideologies of economic expansion persist in spite of the hard realities of justice and sustainability. The further traditional ideologies become removed from the empirical world, the more desperately they are repeated. Ideological controversy too often confuses rather than clarifies the real choices before societies.

One example of the problem of justice and sustainability, the one investigated most intensively by Church and Society, is energy. Present patterns of traditional use of fuel in most Third World countries are becoming increasingly unsustainable. Large-scale deforestation results in soil erosion, flooding and consequent drop in food production, as well as fuel shortages. The economies of the industrialized world that are based on fossil fuels are equally unsustainable. Petroleum is finite in quantity, exhaustible, and unequally distributed in the earth. Coal is more plentiful but also finite in quantity and even more unequally distributed. Most of the major energy sources used throughout the world cannot support economic development for an indefinite period of time. The need becomes urgent for energy conservation, for research and development of new energy sources in a wide variety of situations, for substantial redistribution of available supplies.

Steps that have been taken

The Zürich Consultation of the WCC on Political Economy, Ethics and Theology (1978) considered the prevailing economic thinking in present societies. It proposed an outline of a new paradigm or vision corresponding to the operational requirements of a just, participatory and sustainable society and inspiring a new understanding of the poverty in the world and the demands of the Gospel.

The Zürich Consultation recommended some specific approaches for the future. The debate was widened at the MIT Conference as Faith, Science and the Future (1979, Section VIII),

exposing clearly the gap between traditional economic thinking and the thinking of those who insist on a radically different political economy.

The Advisory Group on Economic Matters, established by the Commission on the Churches' Participation in Development (CCPD) held a series of consultations on these matters. In their final report (March 1982) they also recognized that the task of formulating an alternative-political economy to traditional economic thinking had hardly begun.

Four years after the Zürich Consultation it is clearer than ever that the need for new thinking is urgent. We need to face the problems of the future in ways that are quite different from those of the sixties and seventies.

2. Ethical Issues in Science Education

Science students at the MIT Conference expressed deep concern at the lack of emphasis in their training on the ethical and social implications of science and technology. They also expressed concern over the lack of education in the public in general in science and technology rendering people unable to participate adequately in important national and social decisions about science and technology.

Since MIT there have been three discussions (at Stuttgart, 1980, Jos, 1981, and Amsterdam, December 1981) primarily on the education of scientists and science students. The outcome of these discussions was the preparation of a Workshop on Science Education and Ethics which is being organized by the Free University of Amsterdam in cooperation with the sub-unit on Church and Society of the WCC. About 45 science faculty and students and theologians are expected to take part in the Workshop which is to be held in the Netherlands, June 20-25, 1983. National groups are collecting information on approaches to ethical issues in science education, so that the workshop will have some picture of what is already being done. Each group has been asked to concern itself specifically with three aspects of science education:

a. Science and social responsibility,
b. science and faith,
c. rethinking scientific methodology.

The Workshop will also be concerned with making proposals for curriculum development in these areas of science education.

III. Ethical Criteria for Assessing Specific Technologies

1. The Biological Manipulation of Life

Developments in modern biology have not only revolutionized our understanding of life, they have resulted in the new ways listed below of manipulating living organisms, including human beings. These developments raise two concerns for the churches. Firstly, how can the churches come to a better understanding of the nature of life in all its manifestations in the light of both faith and the new knowledge? The churches lack a theology of life related to the biological understanding of life. A second task for theology and for the churches is to work out responsible attitudes in the light of faith for the proper use of these new discoveries. The challenge here is to ensure that human life is enriched as a result of new discoveries, and that life is enhanced rather than threatened by scientific advances. This challenge has, as yet, hardly been faced.

The theme of the WCC Assembly "Jesus Christ, the Life of the World", is a clarion to us to face these two tasks, that is to make sense of the claim that Christ is the unity of all life including the knowledge of life the new biology brings, and to use rightly this knowledge.

i. Genetic Engineering

In the forefront of biological advances is the ability to manipulate directly the genetic material including transplanting genes from one organism to another quite unrelated organism (recombinant DNA technology). These techniques make possible an increase in knowledge of the genes of human beings and of other organisms. They provide powerful means for the diagnosis of genetic diseases. They make possible the production of substances such as insulin and growth hormone for therapeutic uses from genetically manipulated microorganisms. They provide the hope that one day soon, hitherto untreatable genetic disease may be cured (gene therapy). They provide a new tool for the invention of new crop plants that could relieve the world food shortage, such as, for example, wheat that can grow without nitrogenous fertilizers.

All this offers much for humanity, but at the same time raises many concerns. There is the possible extension of gene therapy to positive eugenics for the purpose of "improving" heredity as distinct from eliminating defective genes (negative eugenics). However, the enhancement of intelligence and the prolongation of life involve traits that cannot as yet be identified genetically, much less supplied at will, but this is a direction in which some people are looking. Gene therapy may be used to alter the reproduction cells in the hope that children of affected parents may be normal, but other possible consequences of such manipulation are unknown. Initial concern about possible hazards of genetic engineering to health and to ecosystems by the inadvertent escape of genetically modified microorganisms has receded in recent years. This has removed one of the main barriers to the commercial exploitation of the technology. But it raises another problem because of the magnitude of commercial operations. A factory using fermenters holding 100,000 litres of genetically manipulated microorganisms synthesizing products such as insulin poses problems not encountered in laboratory manipulations. The epidemic spread of organisms is less likely in industrial countries where sanitation and hygiene have largely removed the necessary conditions, than in Third World countries. Adequate protection in Third World countries would require that production has at least the same safeguards as in developed countries. The process of risk assessment must be an integral part of the ongoing development of recombinant DNA technology. There is need for the development of international guidelines and regulations by international organizations for the development and use of the new bio-technologies.

Another concern is the application of genetic engineering to biological warfare, through the deliberate invention of pathogenic organisms. This threat is not adequately covered in existing conventions on biological and chemical weapons. Scientists throughout the world should be urged not to participate in any research associated with the development and production of chemical and biological weapons.

ii. *In vitro* Fertilization ("test-tube babies")

In vitro fertilization was developed to overcome infertility in a couple by taking an ovum and sperm, fertilizing the ovum in the laboratory and after a few days transplanting the embryo into the womb. This opens up a number of other possibilities. The ovum can be donated by a woman other than the recipient. The embryo can be donated by a couple other than the recipients. A surrogate mother can be used prenatally. Embryos can be stored deep frozen for a variety of possible uses. In the future, embryos of one sex may be selected for transplantation. Embryos may also be experimented upon to test the effects of drugs on the developing human. Techniques of genetic engineering may be applied to embryos. This has already been achieved in mice in which the experimental mouse contained genes from either a rabbit or a human — the rabbit genes were subsequently transmitted through several generations of mice. Attempts may be made to produce hybrid embryos of human and non-human species, e.g. chimpanzee.

iii. **Prenatal Diagnosis and Selective Abortion**

Prenatal diagnosis of genetic disease followed by the abortion of the defective embryo is one form of biological manipulation now commonly practised. A comprehensive study of the ethical issues involved was presented by the WCC in the book *Genetics and the Quality of Life* in 1975. Since then, the application of new technology to this field has increased the number of diseases and abnormalities that can be diagnosed in the foetus. Some of these cause minimal handicap, others are severe disorders. All this raises in a more acute form than ever the problem as to the boundary between normal and abnormal.

The ethical and social issues raised by genetic engineering, *in vitro* fertilization and prenatal diagnosis with selective abortion need to be studied in the perspective of the broader concern for human justice, quality of life and a purposeful human existence. Without such a context of thought the world could easily drift into a new age of manipulation in which humans are reduced to parts to be treated as distinct from whole persons. These issues are considered in some detail in the WCC booklet on *Ethical and Social Issues in Genetic Engineering and the Ownership of New Living Organisms.*

iv. **The Ownership of New Living Organisms**

The ownership of microorganisms became an issue of great moment when the US Supreme Court upheld the issue of a patent on an artificially produced microorganism. This opened the way for those who invent new microorganisms to apply for ownership in the same way as one applies for ownership of a new pharmaceutical product. Proponents of patenting argue that it will stimulate invention and production of useful substances. There are philosophical implications of owning life in the same manner as owning things. Ownership of new living organisms could result in an extension of emphasis on profit rather than on meeting human need. There could be an increase in litigation and consequent restraint in production. There could be further curtailment in the exchange of ideas, and further appropriation by private organizations of research knowledge acquired with the use of public funds.

Patenting of living plants has been introduced into many western countries. Opponents claim that plant patenting will lead to reduced genetic diversity of crops and will enhance the power of seed-handling corporations. Proponents claim the opposite. The ethical and social implications of patenting of plants needs to be considered in the light of Christian concerns so that governments be guided by the people to legislate in ways which will enhance sustainability and justice.

v. **The Control of Human Behaviour**

A number of means are now available for therapeutic control of human behaviour such as electric shock, psycho-surgery and numerous drugs. There is much evidence of the misuse of these procedures, particularly on individuals in relatively powerless positions such as those in mental hospitals and prisons and poor and underprivileged groups. More widespread still is the large-scale marketing of behaviour-altering drugs such as tranquillizers and anti-depressants. They do nothing to alleviate causes of human suffering and may induce physiological and psychological dependency. The Church has an obligation to provide guides to thinking and acting responsibly in all these complex areas.

vi. **Public Health and the Use of Scarce Medical Resources**

Most of the world's poor still lack the basic requirements for nutrition, housing, sanitation and medical care for the maintenance of health. When considering priorities of medical technology, primary focus should be on planning for and establishing systems of health care that serve all and not just a privileged few. We commend the emphasis of the Christian Medical Commission of the WCC on preventive medicine, in both research and practice, as opposed to palliative medicine.

Conclusion

The ethical issues concerned with the biological manipulation of life involve two critical questions. How are we to deal with the problems and opportunities that scientific and technological advances have produced? Secondly, is the direction in which science and technology have encouraged us to go the right one in which to continue? Much of the response to these questions fails to reflect a Christian understanding of human existence and that of other living creatures. Overriding any particular issue is the need for an understanding of what constitutes the value of human life and life in general. Without clearer thinking on this question an ethical response will be haphazard and at times disastrous.

The churches should be in the forefront of thinking in these areas. Up to now, they have given little serious attention to these matters. If the churches are to make a contribution to public thought and policy, they must make major efforts to grasp the scientific and ethical issues in their inter-relationship. On the one hand it will not be adequate merely to repeat old teachings, or to issue edicts or prohibitions as though the churches were the sole custodians of moral authority. Nor, on the other hand, will it be responsible to leave the decisions to the momentum of science, technology and economic considerations as though serious human values were not at stake. Any helpful work of the churches requires serious ethical exploration with the involvement of scientific research workers and practitioners.

2. **Computers and Information Control**

The computer, based on micro-chip circuitry, can today perform technological marvels that stagger the imagination. Its role goes beyond mere gathering and processing of information. With the help of satellite technology, infra-red photography and "imaging systems", it can predict the time and location of storms, prospect for earth resources, transmit images and radio messages all around the world, store and retrieve enormous quantities of information and solve the most intricate mathematical problems. Computers accelerate the pace of automation in industry, and are the means for great advances in medical diagnosis, aviation and space travel, in decision-making that involves a large number of alternatives, in accounting and record-keeping procedures and in calculating consequences of various possibilities of action as well as in robotry, surveillance, defence and industrial management.

One remarkable feature of computer technology is its progressive cost reduction, bringing home-computers and computer-terminals within affordable access of business enterprises large and small, as well as of a limited number of affluent homes.

Our concern here is about what these technological advances do to human beings and to human societies. Computers are, after all, created and controlled by human beings, to fulfil their purposes. They can make and implement decisions by themselves without human interference, but only when programmed by human beings to do so. This is why they are sometimes referred to as Artificial Intelligence or AI.

The distinctive feature of these advances in communication and information technology is the highly organized and centralized control made possible with some combination of people and machines. Authority and responsibility are shared between people and computers. A mistake on the part of one affects the actions of the other, and can often cause catastrophe.

At the World Conference on Faith, Science and the Future (MIT, 1979), Professor Thomas Sheridan of MIT (Professor of Mechanical Engineering) argued that "the new organization — with interpersonal interactions mediated by computers — is alienating" (FSUW, Vol. I, p. 296). His seven arguments were:

i. People persist in comparing themselves to computers and worry about their own inferiority in performing rote tasks.

ii. Computer control distances the human operator from his own actions and their consequences.

iii. Computers de-skill people by making their skills superfluous, and making them mere button-pushers.

iv. The technologically illiterate feel inferior and vulnerable to manipulation by the technologically literate.

v. Computers mystify the enterprise in which one is involved, and make arrogance and snobbism possible for the initiated élite.

vi. While the possibilities of failure in a computer-controlled enterprise are fewer, the consequences of each failure become enormous, and therefore the stakes in decision-making much greater (nuclear plants, air traffic control systems, nuclear missiles, etc.), reducing thus the flexibility of the human response.

vii. Finally there is a growing fear of intelligent machines taking over control and becoming more powerful than humans — though at the moment this possibility is confined to science fiction or horror movies.

Professor Joseph Weizenbaum (also of MIT) asserted at the same Conference that computers poison society with "abstraction" by which he meant the tendency first to confuse abstraction with reality and then to forget about the distinction altogether (ibid. p. 304). Even persons (like a President or Prime Minister) become substituted by their media images, and wars are fought to defend the "image" of a nation. As a computer scientist, Weizenbaum believes that "the computer in our society is in large part a solution in search of problems".

Many of us may not want to go that far in our criticism of computer technology, but we raise certain questions about it, while fully recognizing its merits and possibilities :

- Will computer-based automation displace people from useful employment and create major social and economic problems ?

- Will computer technology be a solution to the problem of growing bureaucracy in government and industry, or will it only make the problem more complex and difficult to resolve ?

- Will computer technology, as it develops, make life more difficult for people who already feel a Kafkaesque sense of helplessness over against an administrative machinery that grows less and less responsive to personal needs and grievances ?

- Will the availability of cheap computing and steering power become a means for de-scaling and decentralizing industrial production ?

- Will the new revolutions in communications technology help or hinder the cohesion of communities, and make larger communities possible ? Will it permit easier inter-human communication between people in mutually hostile nations without interference by governments ? Will it foster the formation of a world community with ordinary people participating and communicating with each other ?

- Will the possibility of global communication through computerized multimedia be exploited by power-groups to brain-wash the whole of humanity as they are now doing to people within nations ?

- It is technically possible that a global computer hook up could make information from national libraries and data-banks available to all the people on the earth. But so long as present international economic structures persist, only a few will be able to benefit from such feasibilities. How do we bring about the necessary political and economic decisions to solve this problem ?

- What are the social and psychological consequences of human beings constantly and frequently interacting with computers ? What lessons do we learn from our experience of interacting with TV for some thirty years or so ?

The question about artificial intelligence becoming equal to human intelligence or even overtaking it does not seem to us particularly urgent or important. If thinking machines develop, they will be human creations. The creators should be worthy of more admiration than their creations.

Perhaps the single largest menace in information processing is in the area of surveillance — of private persons by government agencies or by others. The loss of privacy has deep going psycho-social consequences that need to be looked at.

3. Energy Options

The rapidly changing nature of the global energy situation presents a continuing challenge to the churches. In the last nine years Church and Society has given a great deal of attention to studying these issues at an ecumenical level. It began by looking at the ethical and social aspects of nuclear energy, eventually broadening into the full range of energy issues through the activities of the Energy for my Neighbour Programme (ENP) in the Third World. A number of important concerns have emerged from these activities requiring urgent consideration by the Assembly.

The energy crisis — traditionally viewed as a crisis of supply — has been defined by technical constraints. The solution to the oil crisis, the wood-fuel crisis and the electricity crisis, and so on was to explore for more oil, plant more trees, install more electric systems. But this preoccupation with the "energy supply crisis" and the subsequent emphasis placed on technical solutions not only overlooks the "energy demand crisis" but veils the social side-effects of the various energy supply options.

i. Energy Policy is Social Policy

Energy policies involve some fundamental political and ethical assumptions :

- Debate over energy pricing is in fact a debate about social equity;

- the laying of oil and gas pipelines involves struggles over land claims;

- controversy over energy technology exports from industrialized to underdeveloped countries is an important component in the restructuring of North-South relations;

- condemnation of OPEC for its contribution to the mounting debt of underdeveloped countries diverts attention from the much deeper balance of payments crisis facing underdeveloped countries, resulting from the injustice of the present global economic system, dominated by the industrialized countries.

And yet energy policies are often portrayed not as social problems but only as technical problems. Discussions about technicalities, about mechanical details of energy supply options, while necessary, taken by themselves are devices to divert attention from consideration of the underlying principles of social justice : rights, equalities and responsibilities.

ii. **Energy for my Neighbour Programme in the Third World**

In 1981, the ENP held three regional consultations in Asia and Latin America. (Consultations planned for Africa and the Middle East have been postponed until after the Assembly.) All participants were from the Third World and lived and worked in the regions where the meetings took place. The findings have considerably enriched ecumenical understanding of specific issues. The consultations and the published reports (in English, Spanish and Thai) are stimulating church awareness and activity in the Third World and elsewhere. Other groups and organizations have also found them valuable and useful.

The interrelatedness of the different dimensions of the energy problem is particularly apparent in the Third World context, where energy cannot be divorced from its social and economic context. New research and development of energy technologies will be ineffective unless accompanied by political actions explicitly favouring those most in need. Such decisions must be shaped by the active participation of all concerned.

The following critical issues have emerged which require consideration by the Assembly:

- The existence of energy resources and technologies does not mean that they will be available for those most in need. The political will to serve those who need them most is the single most important factor.

- The energy situations of the urban and rural sectors raise essentially different though not unrelated issues, requiring corresponding responses.

- Centralized systems may partially satisfy the energy requirements of the urban-industrial centres, but they are not appropriate to the needs of rural populations, and in many cases are detrimental to their interests.

- Deforestation deprives the rural sector of its main fuel also resulting in serious environmental impacts such as soil erosion and large-scale flooding with consequently diminished food production. According to conventional wisdom the primary cause of deforestation is the need for wood fuels by villagers. Our studies show that for most countries this is not so. The main causes of deforestation are the urban-based industries and the international timber markets.

- The escalating costs of electricity and other commercial fuels, such as kerosene and diesel oil (even when available) are beyond the reach of most rural people.

- Fuel scarcity is a major problem also for the urban poor. Increasing rural-to-urban migration is making the situation in many Third World metropolitan areas environmentally and socially unsustainable. This further aggravates injustices already experienced by the deprived and oppressed.

Much can be done to redistribute resources, reduce costs and improve technologies. However, the basic human needs of the rural and urban poor will be met only if there is the political will to do so. This is the essential element of more just and sustainable energy policies.

iii. **Nuclear Energy**

a. **Peaceful Uses**

The 1980 Central Committee endorsed the call for a five-year moratorium on further developments of nuclear power as proposed by the 1979 MIT Conference. The global nuclear situation has changed since then, in most cases justifying the reasons for such a moratorium.

The accident in the nuclear reactor in Harrisburg, PA, USA, just three months before the MIT Conference may have had an influence on the decision for a moratorium. Subsequent developments indeed confirm some of the doubts about the use of nuclear energy. Although there was no loss of life, the economic and political costs of the Harrisburg accident are considerable. Clean-up, repairs and the purchase of replacement electricity amount to about 1,000 million US$, roughly two-thirds of the price of an equivalent new reactor. Neither insurance companies, nor the electric utilities, nor government want to underwrite the costs. Such problems plus the fact that in most industrialized countries there is a demand for electricity have resulted in drastic reductions of previous plans, including cancellation of many existing orders.

As a consequence of such *de facto* moratoria the reactor suppliers (based in a few industrialized countries) have been frantically searching for new markets, especially in the Third World, in order to survive. In the last four years they have developed small (50-400 MW) nuclear reactors which are, they claim, appropriate to the energy needs of such countries as Tanzania, Bangladesh and Kenya. The new reactors developed by Britain, the FRG, France, Canada, the USA and the USSR are very compact, and are constructed and assembled entirely by the manufacturer prior to transportation to the destination on barges and/or railroad cars where they are connected to the local electricity networks.

The implications of the deployment of a large number of such "turn key" reactors are considerable. They make the recipient technologically and politically dependent on the supplier. They are expensive and would increase foreign loan debts, which are already very high largely as a result of the oil crisis. It is still an open question whether such debts would be greater than those resulting from the overall costs of the equivalent energy supplied by imported petroleum. In any case such centralized, capital-intensive energy sources favour the growth of urban industrial sectors and militate against the interests of the rural poor.

b. **Proliferation of Nuclear Arms**

Attention has been drawn anew to the link between nuclear energy and nuclear arms proliferation. This focusses attention again on the discriminatory nature of the Non-Proliferation Treaty (NPT) against the nuclear have-nots. The 1980 NPT review conference and the conclusion of the International Nuclear Fuel Cycle Evaluation (INFCE) have failed to improve this situation. Many feel that technical fixes such as the safeguard system of the International Atomic Energy Agency (IAEA) are ineffective in preventing the proliferation of nuclear weapons. Although the link between civilian and military nuclear technologies is not as strong as some maintain, some countries have used the civilian nuclear energy route to develop a weapons capability (e.g. South Africa). The potential export of many small reactors might exacerbate these problems.

The ethical and political aspects of the deployment of new reactor technologies must be given high priority by the WCC. The nuclear debate is dynamic, necessitating constant assessment and evaluation. During the past nine years the WCC has established credibility as an ecumenical forum for the study and evaluation of such issues from interdisciplinary perspectives. In view of the continuing tendency for energy debates to be simplistic, polarized and emotive, together with the large number of as yet unresolved issues, the importance of sane and informed discussion by competent bodies cannot be over-emphasized.

IV. Science for Peace

The subject of nuclear arms and disarmament was not on the original agenda for the MIT Conference but a mounting sense of the threat they represented led the Conference to set aside time to consider the way in which science and technology contribute to the

arms race. The result was the Conference Resolution on "Science for Peace" adopted almost unanimously by the Conference.

In June 1980, the Working Group on Church and Society, meeting in Stuttgart, proposed that as a follow-up to the Resolution the WCC convene an international public hearing "on the increased danger of nuclear war". This proposal was accepted by the Central Committee which authorized the sub-unit on Church and Society and the Commission of the Churches on International Affairs to prepare a Public Hearing on Nuclear Weapons and Disarmament in Amsterdam, November 1981.

The Hearing Report entitled *Before It's Too Late*, was published in May, 1982. The full report of the Hearing including the testimony of the 38 witnesses was published in January 1983. A recommendation concerning the follow-up of the Hearing was prepared jointly by the Working Group on Church and Society and the Executive Group of CCIA and submitted to the Central Committee, July 1982. (For their action see minutes of the WCC Central Committee, Geneva, July, 1982, p. 60).

The Hearing made clear that the role of scientists and technologists is often decisive in the escalation of the nuclear arms race and in creating a situation of greater and greater danger for humankind. As the Report points out: "The pressure of technological innovation is a large factor in the introduction of new nuclear weapons systems by the present nuclear weapons nations (vertical proliferation) and the efforts of non-nuclear nations to obtain them (horizontal proliferation)."

In this regard the Report observes that, "Scientific and technological communities in different countries are beginning to become aware of the ethical implications of their military-related work. They need to be made to understand the implications and possible consequences of the arms race and their personal responsibility to society. Some members of the international scientific community are already engaged in actions to mobilize the public and to counteract pressures for continuing the arms race." The Hearing Group was persuaded that the churches can do much to "help... political, military and scientific workers to understand the moral implications of what they are doing".

RECOMMENDATIONS FOR A CONTINUING PROGRAMME

A. Science and Faith

1. We recommend that in the post-Vancouver period priority attention of the WCC be given to the study of the relationship of God, humanity and nature. Such a study requires the collaboration of perceptive scientists, philosophers of science and professional theologians. It should also be constantly tested in dialogue with people of other faiths and ideologies. A clear conceptual understanding of the relationship of God, humanity and nature would provide a necessary framework for value decisions that have to be made in the orientation of future research in such areas as biotechnology and nuclear energy. Furthermore such an understanding is bound to have long-term consequences for the direction of humanity's development and for the development of Christian thought in relation to modern society. This programme should be undertaken in collaboration with DFI, Faith and Order and other sub-units.

2. The work on science and technology has shown the necessity of a thorough study of the theological basis of Christian social ethics and its implications for the ethical problems that arise from science and technology. However, this needs to be integrated with the social-ethical thought arising from the work of other sub-units of the WCC dealing with social questions. In the future there is need within the WCC for a sub-unit which deals with the *whole* of the Churches' message and responsibility in society. We recommend that Church and Society undertake such an inclusive study. This should involve theologians, natural scientists and social scientists as well as those who are deeply affected by the disorders of contemporary technologically organized society.

B. Science and Technology in Society

1. **Justice and Sustainability**

We recommend that the WCC authorize and sponsor a study of possible new visions of political economy as alternatives to traditional economic thinking. Such a study should involve people of diverse technical skills, economic situations and ideological persuasions. This recommendation is similar to that of the Advisory Group on Economic Matters. (Report, March 5-6, 1982.) We urge continuation of the cooperation between different units of the WCC that led to the Zürich Consultation. We recommend that this study begin promptly after the Assembly.

2. We further recommend that such a new ecumenical study of political economy should include two key issues:

- development and disarmament,
- technology and unemployment.

3. **Ethical Issues in Science Education**

The work undertaken thus far is preliminary to a major effort. It should lead to a much more systematic and widely accepted ecumenical programme on the education of scientists on the ethical and social consequences of science and technology and the education of the people in scientific understanding. To this end the WCC should pursue these investigations further after the Assembly.

C. Ethical Criteria for Assessing Specific Technologies

1. **The Biological Manipulation of Life**

a. The WCC is urged to make the necessary commitment in its programme for an ethical contribution that is both international and intercultural to the issues of momentous human concern raised by the biological manipulation of life. In particular *in vitro* fertilization including experimentation on human embryos, ownership of new living organisms, genetic engineering and control of human behaviour need the serious attention of the WCC and its member churches.

b. We urge that "the Christian Response to the Brave New World of Biological Manipulation of Life" be presented and discussed in a plenary session of the 1983 Assembly in the light of the Assembly theme "Jesus Christ, the Life of the World". By "brave new world" is meant, possible creation of life, present creation of new living forms, the combining of human and non-human genes, the control of human inheritance, and experimentation on human embryos.

2. **Computers and Information Control**

It is recommended that in the period following the Assembly, attention be given to the social and ethical issues arising from the rapid advances in computer technology with emphasis on communications and information processing. These matters should be considered by the section of the Assembly dealing with the issue "Communication and Conviction" and by other sections where the impact of these technologies is considered.

3. **Energy Options**

In view of the results which have already been achieved and the investments of time and money which have been made we believe that it would be highly desirable for the WCC to continue the Energy for my Neighbour Programme. The ground work has been laid for very promising and urgently needed future work. The programme has brought together people with different experiences

and has encouraged local church and other groups to undertake energy conservation, educational and other practical programmes in their own locations.

Various WCC member churches recognize the importance of such a programme. As in the past the mandate for the future should be firmly grounded on the biblical concepts of stewardship of resources, justice for the poor, the oppressed and the defenceless, and responsibility for the future as intrinsic elements in the Christian understanding of righteousness and obedience to God.

D. Science for Peace

1. The Public Hearing on Nuclear Weapons and Disarmament demonstrated the contribution which can be made to the ecumenical discussion on peace and disarmament by specialists in the field of science and technology, including specialists from the social and political sciences. These same specialists need to be challenged on the ethical and social assumptions underlying their work. Given the complexity and the rapidly changing nature of weapons technology this type of dialogue must be supported and extended to new critical areas of weapons development. It is recommended that the sub-unit on Church and Society continue its work in this field.

2. The Hearing also made clear that the work for peace requires an interdisciplinary ecumenical approach and therefore it is recommended that future work should maintain the cooperation already established between Church and Society and CCIA through the experience of the Hearing. ■

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APPENDIX

Chronology of Church and Society Meetings and Publications, 1976 - 1982

1976	May 15-20	Meeting of Working Group on Church and Society (Glion, Switzerland) prepares ecumenical study/action programme on Contribution of Faith, Science and Technology in the Struggle for a Just and Sustainable Society, and proposes a World Conference on JPSS in 1979. Also names Energy Advisory Group to follow up 1975 Report on Nuclear Energy and proposes Energy for my Neighbour Programme.
	May	Publication of *Anticipation No. 22*, on "Science and Faith".
	August 18	WCC Central Committee endorses plans of the sub-unit and accepts the proposal of a World Conference.
	November	Publication of *Anticipation No. 23*, featuring proposals for post-Nairobi Programme on Faith, Science and Technology, and Energy for my Neighbour Programme.
1977	February	Executive Committee of WCC, agrees to proposal for a World Conference in 1979 on the *Contribution of Faith, Science and Technology in the Struggle for a Just, Participatory and Sustainable Society.*
	May 2-13	Church and Society presentation to UN International Conference on Nuclear Power and its Fuel Cycle, Salzburg, Austria.
	June 20-26	Consultation on the Ideological and Theological Debate about Science, Cambridge, UK.
	July 11-16	Consultation on Nature, Humanity and God, Zürich, Switzerland.
	July 19-25	Working Group on Church and Society meets Morschach, Switzerland, to plan for World Conference on Faith, Science and the Future in 1979.
	August	WCC Central Committee approves detailed plans for World Conference.
	September	Dr. Lysaneas Maciel appointed consultant for Energy Programme.
	November	Publication of brochure "Faith, Science and the Future", outlining plans and proposed themes for 1979 Conference.
	November 17-20	WCC Regional Seminar on Faith and Science, New Delhi, India.
	December	Member churches invited to nominate participants for 1979 Conference.
1978	January	Negotiations with the Massachusetts Institute of Technology to hold the Conference there July 12-24, 1979.
	February	Publication of Energy for my Neighbour packet and launching of programme.
	May 2-7	Consultation on Ecumenical Concerns in Relation to Nuclear Energy, Geneva. (Sixty nuclear scientists, theologians and others as participants.)
	June 5-10	Consultation on Political Economy and Ethics (Zürich), organized jointly with CCPD.
	July 27-August 2	Consultation of Science Students (University of Reading, UK), to prepare Science Students Conference; Peter Scherhans seconded by EKID as conference organizer.
	August	Publication of *Faith, Science and the Future*, Preparatory Study Book for the 1979 Conference.
	August 25-28	Consultation on the Contribution of the Churches of the Socialist Countries to the WCC Programme on Faith, Science and the Future (Erfurt, GDR).
	August 29 - September 3	Enlarged meeting of the Working Group on Church and Society (Erfurt, GDR), to

		prepare programme of the 1979 Conference and complete selection of participants.
	September 18-22	WCC Executive Committee (Finland) reviews programme for 1979 World Conference and Science Students Conference.
	September	Dr. Maciel resigns as Energy Consultant to return to Brazil.
	November	Publication of *The Human Presence: An Orthodox View of Nature*, Metropolitan Paulos Gregorios.
1979	January 1-11	Meeting of WCC Central Committee (Kingston, Jamaica) reviews plans for the World Conference and approves statement on "the authority of the conference". Publication of *Anticipation No. 25*, "Burning Issues".
	April	Meeting of officers and staff of Church and Society (London) completes preparations for the Conference.
	June	Publication of *Anticipation No. 26*.
	July 6-11	Conference of Science Students (91 participants), Wellesley College, Mass.
	July 12-24	World Conference on Faith, Science and the Future, MIT; 405 official participants and 500 accredited visitors, staff and press.
	September to December	Preparation of Report of the MIT Conference: *Faith and Science in an Unjust World.*
	November	Janos Pasztor, graduate engineer, joins the Church and Society staff as consultant for the Energy for my Neighbour Programme.
1980	March	World Conference Report published in two volumes.
	May	*Anticipation No. 27*, Responses to 1979 Conference.
	May 27-June 1	Working Group on Church and Society meets Stuttgart, FRG, to review response to MIT Conference and make plans for follow-up. Concentration on six issues.
	August 14-22	Presentation to WCC Central Committee on the 1979 Conference; addresses by Prof. Jonathan King, Prof. Enilo Ajakaiye and Metropolitan Paulos Gregorios. Committee commends the Conference Report to member churches for study and action.
		Central Committee also requests Church and Society and CCIA to sponsor ecumenical Hearing on Nuclear Weapons and Disarmament.
	September to December	Staff travel for regional follow-up in Asia, Europe and North America.
	November	Staff presentation to *Mankind and Energy Conference*, Pontifical Academy of Science, Vatican.
	November	Preparatory meeting (Geneva) for an International Public Hearing on Nuclear Weapons and Disarmament.
	December	*Anticipation No. 28*. Theme: Energy for my Neighbour.
1981	February	Publication, Prospectus for Public Hearing on Nuclear Disarmament (English, French and German).
	March	Two Asian Regional Consultations (Madras and Chiangmai). Theme: "Towards more Just and Sustainable Energy Policies".
	May	Staff visit to Latin America, to prepare regional energy consultation.
	June 11-14	Preparatory meeting for the Public Hearing on Nuclear Weapons and Disarmament, Vogelenzang, Netherlands.
	June 15-19	Study Group on Ethical and Social Issues in Genetic Engineering and the Ownership of Life Forms, Vogelenzang, Netherlands.
	June 20-27	Working Group meeting, Jos, Nigeria, to review MIT Conference follow-up programme and discuss issues of Faith and Science in the African Context with 20 African scientists and technologists.
	August	Publication of *Energy for my Neighbour — Perspectives from Asia.*
		WCC participation in UN Conference on Energy, Nairobi, Kenya.
	October 26-31	Latin American Regional Energy Consultation in Lima, Peru.
	November 23-27	Public Hearing on Nuclear Weapons and Disarmament, Free University of Amsterdam. 38 expert witnesses testify to Panel of 17 church leaders. 350 observers and press attend.
	November 29 - December 1	Planning Group for Workshop on Science Education, in cooperation with the Free University, Amsterdam.
1982	March	Publication of *Energy for my Neighbour — Perspectives from Latin America* (original in Spanish with abridged English translation).
	May 14	Publication of *Before It's Too Late.* Findings of the Amsterdam Hearing (English, French and German).
	June 7-13	Meeting of the Core Group of Church and Society to prepare recommendations to the WCC Assembly on future programme (Bigorio, Switzerland).
	June 27-July 3	Meeting of the Advisory Group, Energy for my Neighbour Programme (Geneva).
	November	*Anticipation No. 29*. Theme: Alternative Energy Paths: Utopia or Reality?
1983	January	Publication, Complete Report of Amsterdam Hearing on Nuclear Weapons and Disarmament, Geneva, 391 pages (English).
	June 20-25	Workshop on Ethical Issues in Science Education, Amsterdam.
	June	*Anticipation No. 30*. Theme: Peace and Survival.

FACING THE SOCIAL AND TECHNOLOGICAL FUTURE WITH HOPE

Statement from a Christian Study Group in France

An Emergency Situation

The present upheavals have plunged the world into a state of emergency. In the wake of the events of the past years we hardly need to emphasize its dramatic intensity. The denial of a person's right to be different, of his or her individual freedom — an attitude which in the recent period of this century has claimed millions of lives — is reappearing with renewed force, the result of the general exasperation inherent in conflict. The explicit acceptance of war as a solution is once again showing its ugly face.

- The crisis which is shaking the Soviet and the Western systems alike heightens the underlying causes of East-West tensions, at the same time aggravating mutual distrust. The scope and the very possibility of negotiations at international level are in constant regression; levels of armaments, calculated with care in both camps, have long transgressed the limits of the absurd; new weapons are all the time appearing on the scene, and the resulting overall escalation therefore weakens even that paradoxical security afforded heretofore, when nuclear arms were restricted to strategic weapons, by the "balance of terror".

- The Western economies nurture massive unemployment and wild competition both within and between nations. The crisis, for too long viewed as a cyclical, passing event, is now thought to be the sign of a profound process of economic and social change, to which no known formula, however, successful in the past, seems to respond.

- In the societies in Eastern Europe, as dramatic events have reminded us, present power systems are unable to accept the existence of other social participants and their right to a share of responsibility, thereby seriously jeopardising the development of their countries.

- In the developing world the sudden irruption of modern technology, responding only to the logic of the world markets, has led to serious breakdowns in the social fabric. The most obvious are population imbalances, the squandering of land, the mushrooming of shanty towns and, finally, the spread of hunger and mass-impoverishment. The process of industrialisation, in the formidable grip of the transnational networks, financial, industrial and commercial, directs growth along paths which have little to do with the priority aims and objectives of national development. At the international level short-term interests hinder long-term solidarity, despite the undeniable growth in awareness demonstrated within the European institutions, the United Nations, and through many private initiatives. In short, the North-South dialogue, perhaps more tragically than any other type of relations, is dead-locked by the scourge of inappropriate national structures and the lack of any international control.

In the face of these threats we are caught in the network of a growing interdependence — commercial, industrial, financial, social and cultural, scientific and technological. Our fate depends upon what happens and what is decided elsewhere, not least because man's material existence can only be guaranteed in its present form thanks to the frenzied exploitation of common resources that are finite and non-renewable, or obtainable only at increasingly higher costs. Thus the problems of growth, of waste and pollution, are inherent in present models, they can be overcome but require global concepts and coordinated management.

The fate of all of us — citizens of today and tomorrow — depends on our ability to manage and direct those developments. For this network of interdependence does not concern today's human beings alone; tomorrow's generations will continue, to a greater or lesser extent, to be its prisoners. To the need to think on a worldwide scale must be added the need to think on a time scale.

Young people are often the ones who sense the pressing nature of these needs more acutely. Since the end of the 60s in France and the other industrialised countries they have demonstrated their impatience with the sclerosis of society and its lack of vision. Since then their rejection of the dominant ideologies has often, in the absence of a clear perspective, taken the form of a search for fringe ways of living and of active participation in the struggle for peace and for human rights. Their radical and often uncompromising demands for the present are a powerful incentive to start building a different world on new foundations. There are two complementary questions: "where do we want to go?" and "where can we go?". The first can be answered in different ways. But to the second, a question which can only seriously be posed in respect of humanity's long-term future, given our interdependence in space and time, there is no answer at all.

Deep-seated disorder, but opportunities to be grasped

There are many causes for our disarray, and it is not always easy to recognize their interaction and intricacies. Among those already acknowledged we want to highlight — and briefly examine — one in particular: the growing complexity of the techno-economic trends. In our opinion this is where the roots of many of the main disorders are to be found. Here, too, lie the enormous opportunities — even if other sociological and political repercussions prevent us from seizing them.

Compared to the past, today's situation harbours a radically new element: the explosive advances of one of the driving forces behind the recent evolution: scientific and technological research, now endowed with vast resources. All sorts of national structures and international mechanisms are irrepressibly searching — and imposing — ways of applying to the economic world the results of their discoveries.

Over the thousand years of technological history, scientific discoveries and technological progress were initiated by men and

women living with no contact amongst themselves; gradually they drew together and, for several decades now, they have been working in constant contact, ever more closely organized at the world level. This phenomenon of present civilisation would therefore seem to originate in an obvious logic of efficiency — a technically-based logic. In actual fact it came about through the pressures of a variety of forces and interests: firstly military forces, but then also the interests of major industries, accepted and strengthened by the authority and ambitions of the state. Today the heads of all companies and those in positions of economic leadership know that, in a climate of intensive and general competition, their survival depends on their capacity to innovate, assimilate and harnass, in their specific field, the techno-economic progress which is part of their environment.

The ideology underlying this movement cares little for its social and economic implications: everything which can be done, given the present level of knowledge, to integrate into the general stream of activities, a product or process that is temporarily (or even only appears to be) more efficient than that which it replaces, is considered progress.

Techno-economic renewal, in itself, should not be called in question. We know that in many fields it has brought very positive results. But its present motives and methods often confer upon it patterns and consequences out of all proportion, with the result that economic and social evolution can no longer be predicted and becomes uncontrollable. The momentum comes from a multitude of individual decisions most of them conceived within a very limited horizon. To be sure, some of these decision-makers have sought to broaden their vision to the new dimensions of space and time in order to understand in its totality and its pattern of change the environment in which they must plan appropriate strategies. The development of public and private planning was, in concept, a major innovation. Its practical applications were not, however, pursued with sufficient consistency and perseverance against the background of growing complexity to project more than a flickering light on the trends and phenomena that need to be masterminded.

The Challenge of "Heavy Structures"

Today, therefore, all the decisions are taken against a backcloth of a totally uncertain future. A number of these decisions concern the so-called "heavy structures": they affect the infrastructural machinery of production, education and training systems, lifestyles related to the complex public and private service sectors, basic training and professional qualifications for those of working age, information systems (to clarify decisions and provide material to the political debate); many more examples of these "heavy structures" could be cited, among them, alas the armaments industry with its all-too-efficient commercial network. These structures are at once economic, institutional and cultural. We call them "heavy" because they can only be adapted at high cost, and over a long period of time, and therefore they are very difficult, if not impossible, to modify once they have taken shape.

In this way, they shape the future and decisions concerning them, unless carefully planned, can come to nothing or risk changes that could not be contemplated. If they are to underpin, in any real sense, any coherent blueprint of society, they must be made compatible with a number of explicit and sufficiently clearly defined views of the future — even if only in the form of strategies modified according to the situation.

Thus the obscurity of the future — about which the only thing we can say with any certainty is that it is rapidly cutting us loose from our present experiences without giving us the opportunity, consciously, to aspire to any kind of real plan — contributes to a considerable extent towards explaining present confusion. We maintain, however, that this obscurity is not inevitable.

This is the option underlying our approach: a considered rejection of inevitability. It is an ethical choice which, in our opinion, is urgently required and which cannot be avoided. We are also convinced that, today, it can find support in new technical options.

The Technical Conditions Required for a Truly Democratic Debate

We are convinced that, given the will to do so, wise steering in the right direction of those technological developments which, today, are theoretically possible, can illuminate and guide the future. In this belief, we in no way ignore the conflicts inherent in modern society: rather we recognize the need to integrate multiple and diverse social aspirations in an undertaking which must remain pluralistic and, in so doing, must cope with the most threatening contradictions.

We must, therefore, either perfect or create instruments which will make real political debate both possible and permanent, and, ultimately, make the changes necessary to ensure consistency between the fundamental decisions.

In this perspective our first emphasis is on the problem of information.

Of course, the possession of adequate information is not enough to ensure that all decisions are relevant, or that the political debate will be ordered so as to achieve something concrete, illuminating all our future thereby. It is, however, obvious that, in the absence of reliable and adequate information, all action is blind, leading to chaos and injustice. Today, however, potentialities exist, far more promising than what is possible with the instruments at present available.

At this stage in our reflexions we shall not discuss the institutional framework or the concrete methods of effecting change which will lead towards a consistent set of basic decisions. We shall only sketch out the general requirements which these institutions and methods must satisfy. We shall also mention some basic difficulties which must be analysed in depth before we can discover the technical tools likely to lead to workable solutions.

The opportunities available today for understanding, forecasting and orientating the future, in a democratic manner, can materialise if a number of basic prerequisites are satisfied. Let us set them out briefly. Given the importance of what is at stake, we make no secret of the fact that they represent an exacting task.

1. An effort to *gather*, *synthesise* and *disseminate* widely the information in the economic and social fields, including, in particular, technological phenomena.

   Today's techniques in the field of information technology make it possible to do this vastly more efficiently than ever before. For this reason they must stop being utilised merely in response to economic considerations that are piecemeal, and short-term. They must interpret the desire to understand linkages of actions, technological innovations and reactions which govern the lives and evolution of societies. Finally they must demonstrate that they are concerned with providing a substantive basis for the political debate.

2. The will to institute *decentralized administration* in all fields of economic and social action.

   Decentralization means bringing people in positions of responsibility closer to the facts which they must know in detail: the needs, the hopes, the conflicts, the techno-economic data, the cultural context of the reality around them. So decentralization is essential to ensure democracy within a

society whose members will enjoy an enhanced level of culture and means of communication.

3. The will to develop broad interpretations of the way social agents depend on each other and manifest their solidarity with one another through adequate political and geographical distribution and organization of the channels for information, concentration and forecasting.

A key to understanding our modern system is the recognition of its interdependence, an interdependence which is revealed not only in technical-economic terms but also in the deep-seated bond between humans and the need for political action, which runs no risk of oppressing the weak. For all these reasons there is a need for organizations which are effective in achieving agreement at both regional and national level. They in turn need to be in touch with their fellows in Europe and then elsewhere in a movement towards world cooperation in the same spirit of active dialogue.

4. There needs to be democratic debate on all issues which are raised when prospects appear to conflict with elements that at present polarise our society.

When a society is experiencing rapid evolution, no future prospect is, in fact, complete in its formulation until the political design within it has been laid bare; its ability to influence the behaviour of the members of society depends upon the extent to which this design has been discussed, on the basis of an open and adequately informed debate conducted over a sufficiently long period for individual points of view to be mutually understood and compromises to be reached in situations where conflicts that dialogue alone cannot solve are fully brought to light.

5. The practice of *concertation* — at *European* level, and then, wherever possible, at the world level — extending to the *co-ordination of decisions* in all cases where the arbitrary nature of unilateral decisions (by one state or one transnational corporation for instance) would make forecasting so hazardous and risks of inconsistency so unacceptable that perspectives, projects and options, — in other words, the area under discussion — would remain utterly obscured.

It has been shown all to clearly, for us at least, that the market economy when left to operate by itself, is unable to meet these conditions. Contrary to what many people still think, it cannot be viewed as the only valid alternative to a centralized system that brings all decisions into a coherent framework at the price of intolerable oppression. We shall not bow to the economic and technocratic tyranny which it too generates and which nowadays dominates and constrains research, the production and distribution of goods as well as — to a quite unacceptable extent — social relations. Let it be equally clear that we are by no means thinking of changing Europe into a centrally planned economy. Quite to the contrary, it is in order to revive and strengthen the citizens freedom that we so obviously need mechanisms, at the appropriate geographical level, and institutional mechanisms which can discharge a function of regulation and control when society is organized in a decentralized way. These mechanisms must establish competitive markets in all areas where the results will not be politically and socially unacceptable, while at the same time defining clear and realistic plans as a basis for a democratic debate.

This need is all the more urgent as we find ourselves at the threshold of a technological "mutation" based on electronics, robotics and biology which may radically transform our lives and society, possibly through serious upheavals. No longer can we allow this transformation to be subjected to decisions worked out by large transnational corporations in the secrecy of their laboratories — under cover of the fiction of a "free market": free for whom?

This is our belief: it is technically possible, starting from the existing situation to develop new mechanisms of control and regulation as well as centres of reflexion from where ideas and concepts will emerge, sharpening and clarifying our perceptions of the future and generating constructive political debate. There is, however, one prior condition. This is: a minimum of consensus between partners — often in an adversary relationship. Can this be achieved? Is the existence of new technical instruments — and its inherent potential for solutions — likely by itself to create the dynamic that could bring about such consensus? An affirmative answer can only be given once our institutions have been exposed to the light of day, and have been convinced of the futility of resisting change.

The Mass and Inertia of Institutions

All those who apply their minds to scientific activity have one thing in common: they aim both at understanding and predicting. The ambition of controlling and orienting events is a political one. The importance of developing knowledge cannot be denied. Nevertheless, all things considered, the efforts required for enhancing knowledge have no common measure with those needed to shape history.

Of course, here and there we can observe the first signs of a new awareness, the assertion of a felt need, the promotion of some institutions along the general lines mentioned above. But the effect of these first steps quickly fizzles out: to carry the effort further there must be foresight, perseverance, humility in action. A necessary condition for progress is often, alas, the calling into question of immediate interests, something which far surpasses the normal capacities of the members of society. This incapacity, moreover, stems not from some accidental deafness that a dialogue and discussion, supported by rational analysis, would sooner or later overcome. It derives rather from the more general conditions affecting our present-day existence. Men and women bowed down with pressing problems, at the mercy of competition that is both fierce and widespread, would find the task of concentrating on what would be required of them by some collective creation — particularly if the stages are slow and the objectives distant — too much to cope with. For the players in this game of conflict which now has global dimensions the rules of the game are important; ultimately the sole goal is survival — and if possible, victory over, even through elimination of, the other.

Another basic difficulty lies in the rigidity of social and political life in modern times: any attempt to reach a common goal must be pursued through a series of different institutions — economic and political, agencies, or trade unions — vying with one another time and again, all along the way, as they represent the various groups within society, expressing the views of these groups and defending their interests. In order to function these institutions need to acquire some power and then to protect it. But once established, they develop a sluggishness or inertia that tends to imprison them in the confines of their own dynamic. In the long run the defence of their own power in the struggle for short-term objectives, the assertion of group or corporate self-interest count as much, if not more, as the more permanent interests of the men and women they represent. Confronted with the demands for political change their attitude is always ambiguous. The conflicts that arise are generally antagonisms that are prone to be settled by recourse to implicit conventions: only rarely do they trigger a dynamic of change.

The Need for an Ethical Response

Such tendency towards inertia, and the defensive violence of old social systems which often is its counterpoint, results from

sociological mechanisms as much as from economic determinism. The immediate antagonisms would yield to the call for some kind of longer-term cooperation; not one of these groups or individuals offers any relevant response, neither large companies, workers' organizations, state or international institutions. None of them seems able or willing to propose in sufficiently general terms the solutions for which we are searching, those that would lead us beyond the narrow considerations of the means, or, at best, of partial ends. At this point ethical considerations must intervene.

Ethical reflexion — as suggested at the outset — is increasingly necessary as the world is increasingly fashioned by human activity. It is critical which way the activity will be directed — whether it will be in the form of destructive, oppressive notions of efficiency or rather in progress stemming from democratic modes of sharing and the freedom to innovate.

This is our Plea

Our plea is addressed to all men and women of hope in Europe, the churches and militants within the churches, and the institutions concerned with the ethical principles which should govern the relations between human beings and between nations.

— Why call upon the churches?

Because several members of our group are personally active within the Church and they feel that attitudes expressed in this research strike a note in harmony with the message of the Gospel, the message that the churches are called upon to proclaim to the world.

- The God of the Bible, the God of the Gospel, is He not "He who is to come"? He is the God confronting us. He is the "God of Abraham, of Isaac and of Jacob". He is not, however, a God to Whom the past is sacred; not a protector of the established order, a dispenser of immutable truths that could be possessed for all times. He who believes in the "God who is to come" is acting in the present with the assurance that there is a future, a future that is entirely open.

- Is Christ not an anticipation of that future in its accomplished realisation, "God with us"? When He announces that the kingdom of God is imminent, He calls for repentance and introduces the transforming power of hope and freedom in the midst of present trials. Standing clearly in the prophetic tradition, Jesus consistently sided with the poor, the outcast, the victims of injustice in His time, whom He knew to be beloved of His Father. Through His words, His chosen destiny, His death and His resurrection, liberation found its place in history.

- Through the power of the Spirit we are liberated from the bonds of the past and from an anguished linkage to the status quo. As we assume the attributes of the "new man" by sharing in Jesus' death and resurrection, expecting the coming of the Kingdom, as a gift of God, we are made free to take on our responsibilities in confronting the challenge of the present with all its urgency. In this perspective "charity" is not just the love of one's neighbour. It becomes the "charity of the long-term", just as essential, linked to the other through the mediation of human structures and institutions and thus widened to the dimensions of history.

By their emphatic affirmation that the structures of our societies can be redeemed and used as instruments of God, Christians will give a clearer answer to what the Gospel expects and demands of them.

— Why do we address this call more specifically to those men and women of Europe who share in our hope whatever the foundations of their convictions may be?

Because the group that worked in the fellowship of Villemétrie includes men and women who, unlike the millions within the Church, do not refer directly to the Gospel, yet share with them a hope rooted in the future. We are all caught up in the tragic alternative that challenges man's moral strength: either we resign ourselves to the simplistic objectives and summary disciplines that new totalitarianisms will eventually impose, in an effort to avoid disintegration and complete chaos; or we decide to play a part in the necessary remodelling of economic, social and political structures in an attempt to build the brotherhood of nations.

Whatever the global vision towards which our hope leads us, whatever the philosophy, religious or atheist, Judeo-Christian or not, Marxist or libertarian, from which each of us receives inspiration, there will always be an abyss separating present-day reality from the prospects that invites the full commitment of one's convictions and energy. This abyss is for every one the cause of deep anxiety. Christians recognize it as an "existential" component of their faith in Jesus Christ — the dark night of God's abandonment; the others confront it more directly, wondering through what monstruous manner the utopias and revolutionary movements of the 19th century or, later on, the genuine reformists, the intellectual heirs to the New Deal, have given birth over the last 50 years to so many wars and goulags, and to the contemptuous denial of human fraternity, manifest in so many avatars of a harsh and hard world.

Christians glean hope from a perspective inseparable from the resurrection of Jesus Christ: others find that sheer faith in mankind can rekindle a sense of generosity and thereby set in motion new movements of solidarity which, today, would bring into play an immense progress in human knowledge. A new life-blood could be infused in the hopes and expectations, so often disappointed, that social movements — and their historical manifestations — have always fostered. This new vitality could be so powerful that no passé ideology, whatever its colour, could deflect men and women of hope from joining in the quest, which we have tried to evoke, in feeble and faltering language.

There is no ready-made formula for building a society in which 6 billion people could live — in the full sense of the term — at the beginning of the next century. We cannot, therefore, avoid today's decisive question: how can we mastermind, control, and orient the techno-economic dynamic force at work in today's society, in order to promote throughout the world a democratic alternative, at once more fraternal, and pluralistic, and capable of efficacity and encouraging innovation?

There are many individuals, who, like us, deeply feel the burden of weight exercised by the institutions, and the lack of transparence they thereby introduce in the realm of human communications. These individuals are searching for a way out in "alternatives" often on the fringe or the margin of the "system". They share with us that desire for a greater area of freedom for every citizens vis-à-vis oppressive structures and institutions. But these different lifestyles, more generally these modes of community life, will not provide an overall solution, if only because they stop short of reforming the central institutions and in particular, those of the state. Our goal goes further therefore; it is an invitation to citizens to mastermind the institutional system itself — for it should support initiatives of this kind and encourage them, instead of seeking to relegate them to the fringes of social life and action.

What are we calling for?

Our immediate object is to occupy a ground and reach a position from where we may constantly remind the institutions, in terms adapted to the circumstances, of the requirements of a global and long-term evolution, and contribute to the vitalisation of the fundamental debate; "where do we want to go?" "Where can we go?".

For this reason we address ourselves first and foremost to men and women of hope — those who refuse to be overwhelmed by the difficulties of the moment, and to be driven by the myopia of institutional or individual egoism, those who feel sufficiently motivated to commit themselves to a process of reflection, and debate.

First of all we would propose that, in order to engage in a fruitful process of mutual reflection they make themselves known — so that working groups can be set up locally to bring up to date and further develop the analysis which has already begun. The preceding pages are only a suggested starting point. Many topics are urgently in need of reflection. Some of them are technical but closely linked to the political and ethical analyses; others should focus on the basic conditions of life in society.

Next we would ask them to try and organize a dialogue, either as a group or jointly with political parties, trade unions, associations, local authorities, governments, European of international organizations — in order to give voice to the global concerns that we express here — while in the meantime, together, we would strive to formulate them in greater detail, and to translate them into lines of action.

As we urgently call upon others to join and help us, we are of course equally open to criticism, however radical, that may be forthcoming, related to the very undertaking itself, its points of departure and the findings it reaches.

The present situation suggests that there is a vast ground for our undertaking. The French government, for example, has stated its interest in delineating a long-term perspective. In a world situation which is becoming dramatically unpredictable, it is, however, immediately confronted with tremendous difficulties. Is there not perhaps the danger that it will overlook the conditions which are crucial for the launching of a democratic debate and the establishment of the necessary control mechanisms? More particularly, is the hope now vanishing of achieving any real agreement at the European level — let alone the world level?

From now on — as a necessary dimension of the search for a way out of the present crisis — a European reflection as here suggested should seek to bring about a dialogue with men and women of hope elsewhere in the world notably in those countries which wield political power commensurate with their dominant economic position, and in those whose development is still so precarious. As member of the World Community we are accomplices in its injustice and its violence. We cannot be absolved from accepting a life so full of contradictions. How can we overcome this predicament? How can we overcome it together? ■

NUCLEAR ENERGY REVISITED

Janos Pasztor

The most controversial recommendations of the 1979 Conference on Faith, Science and Future were those dealing with nuclear energy:

"We recommend to all national governments that they:

.....

vii) ... use existing nuclear plants only to the extent, for the purposes, and for the time that there is no better alternative;

viii) immediately introduce a moratorium on the construction of all new nuclear plants for a period of 5 years; the purpose of this moratorium is to encourage and enable wide participation in a public debate on the risks, costs and benefits of nuclear energy in all countries directly concerned;

ix) not reprocess spent nuclear fuel to extract fissile material such as plutonium — except for separation of small quantities for research and medical applications — and not construct plutonium fuelled reactors;

....." [1]

The Central Committee of the WCC, at its meeting in July 1980 adopted these recommendations although by a smaller majority than the conference participants. [2] Now, four years after the conference it is appropriate to look back and evaluate their usefulness.

Public debates on important concerns are not common in most countries of the world — they are a privilege of a very few. Consequently it would be naive to expect that such WCC recommendations would result in its member churches calling successfully for moratoria and public debates on nuclear energy in all their countries, even where their voices are influential. The participants at the MIT conference, as well as the members of the WCC Central Committee were well aware of this. Nevertheless they decided to make the strongest possible statement regarding the need for continued debate and re-assessment of the role of nuclear energy in all the countries.

In a general sense, these recommendations were indeed useful for many of our member churches. Although national debates on energy policy and on the role of nuclear energy have taken place only in a very few countries (with or without church participation), the plea for a moratorium has resulted in the initiation or the continuation of discussions within the churches, and in debates between the representatives of churches and of the governments/industries concerned. In many instances, such discussions have resulted in specific actions, [3] such as the limitation of future nuclear capacity in Sweden; discovery of further faults within existing nuclear plants (e.g. the discovery of a fundamental design error in the Diablo Canyon plant in California, or the discovery of thousands of defective steam tubes in the Three Mile Island plant in Harrisburg, Pennsylvania); the discovery of hitherto unknown (or suppressed) environmental impacts (i.e. impact of polonium released from the Windscale facility in the UK); or the provision of more information to the public about certain aspects of the nuclear fuel cycle (e.g. in the GDR, see box).

Developments in nuclear energy in the last four years have confirmed the soundness of the arguments, on which the decision to call for a moratorium was based. To illustrate we reproduce a few reports received from selected countries. (See box on page 18)

In the period 1979-1983, the world has seen further increases in the price of all commercially traded energy sources — the largest in

KOREA

A confidential World Bank document released through the Freedom of Information Act on February 3, 1983, reveals serious safety flaws in the operation and construction of nuclear power plants in South Korea. In part, the report indicates:

- Rushed construction schedules have taken precedence over safety measures;
- the Korean nuclear power programme lacks sufficient trained and qualified operators and personnel;
- there is no "detailed and specific" TMI (Three Mile Island) emergency procedure;
- the Korean government has not developed a comprehensive programme for the storage and disposal of radioactive wastes;
- various US Nuclear Regulatory Commission (NRC) regulations have been violated.

This report was based on a study by Salomon Levy, a former senior executive of General Electric, now an independent nuclear power consultant. Levy was commissioned by the World Bank to make this 1982 study and an earlier one in 1980 for the South Korean government.

Levy's charges directly challenge the role of US multinational corporations in South Korea's nuclear programme. As nuclear power sales dropped in the US during the 1970s and continue to do so, the US State Department pressured the South Korean government to buy US plants. Shortly after the bloody Kwangju incident in May 1980, the president of the US Export-Import Bank gave the new military government of Chun Doo Hwan the support he needed. $ 600 million in new loans were promised, primarily for the sale of Westinghouse reactors. At present, South Korea has one fully operational nuclear power plant. Under current plans, there will be over 25 nuclear power plants by the year 2000 in that country to run its export-led economy.

As of 1982, the US Export-Import Bank has already lent the South Korean government $ 1.9 billion for Westinghouse reactors, US supplied nuclear fuel, and Bechtel Corporation engineering services, the company's top executives having included US Secretary of State George Shultz and Defense Secretary Casper Weinberger. Bechtel also plays a key role in government-owned Korea Electric Power Corporation. On February 7, 1983, Mr. Shultz visited South Korea to inspect and praise the South Korean and the 39,000 American military personnel. He met with Chun Doo Hwan, insuring the United States' commitment to South Korea's "security".

One of the prime factors causing increasing concern about the construction of South Korean nuclear plants is the haste to build them. Due to the nation's heavy debt, contractors push construction schedules to maximize the use of borrowed capital. In 1981 President Chun called for "shortening the period of various government-sponsored construction works, including nuclear plants, with a view towards maximum economic benefits". As a result of such urgency, South Korea has the highest accident rate in the industrialized world and when applied to nuclear power, it appears to be causing short term construction problems and long term health hazards. The government is also spurring construction before an anti-nuclear movement develops which, so far, has been well controlled. As one South Korea energy consultant said, "People like me, who are opposed to nuclear power, what can we do? If I write an article for the paper, it will be censored. There is no discussion publicly of nuclear power. It is not allowed. So there can be no objective criticism. What am I going to do? Go out in the streets and shout? I'd be immediately arrested." ■

THE NETHERLANDS

There has been a substantial public involvement in the energy future of the Netherlands during the last few years. Here is a brief chronology of important events:

— **Fall 1979.** The energy working group of the churches decided that the call for a "broad societal debate on energy" from the MIT conference was indeed appropriate for the Netherlands, especially since a moratorium had been in place for some time (originally initiated by the churches and accepted by the government).

— **1980.** The political debate focussed on the exact terms of reference of the national debate and the commission to organize it. The churches were actively involved in lobbying for a "bottom-to-up" approach. They also published a book on energy and the importance of the national debate.

— **Spring 1981.** A steering committee was formed to direct the national debate. Its first action was to focus the discussion on overall energy future, as opposed to the original plan of the government, to focus on nuclear only.

— **Remainder of 1981.** The committee started the information phase, resulting in 4,000 reactions on energy policies: including individual suggestions as well as complete institutional responses. The committee had a substantial budget to do further research on relevant subjects. They funded, for example, a "Lovins-like" study costing 1.6 million guilders. Churches were also actively involved.

— **First half of 1982.** The steering committee organized 4 major hearings on some technical issues, such as the cost of nuclear energy, risk analysis, waste management, etc.

— **Second half of 1982.** Four major energy scenarios were developed by the committee. Also the final phase, the discussion was planned.

— **First half of 1983.** The committee published its interim report in the form of a cheap book, and using other media such as TV. 200 discussion leaders had to be trained. Churches also participated in various discussion platforms.

—**Remainder of 1983.** The national discussion has just started, but the energy issue is receding in importance as a result of increased availability of local gas supplies, and the appearence of other difficult problems such as unemployment and cost of living. The final report will be due in the fall, preceding parliamentary debate and decision-making. The churches are also debating for the choice of one specific scenario. This will be decided at the various synod meetings during the course of the year. ■

GERMAN DEMOCRATIC REPUBLIC (GDR)

The results of the 1979 Conference on Faith, Science and the Future were met with great interest in the churches and the parishes of the GDR. Synods reacted to the report of the Energy Section by requesting the church leadership to take up dialogue with representatives of the industry and of the government concerning issues of energy conservation, environmental protection and the peaceful uses of nuclear energy. A prelude for this dialogue was the experts' talk between the Conference of Evangelical Church Leadership and representatives of the government in March 1980.

A discussion of the role of nuclear energy in the GDR has to take into account the fact that approximately 60% of primary energy comes from locally produced lignite. The contribution of nuclear energy is about 3% of the total (12% of the electricity). The

crude oil in spite of the sudden (but only temporary ?) price decline in early 1983. The price of electricity rose relatively slowly during this period. At the same time, the scarcity of traditional fuel sources in the rural areas of underdeveloped countries has become very serious.* Under these circumstances, one might have expected that the world would tend toward greater reliance on nuclear energy for the generation of electricity and for heat, or in some cases for combined heat and power schemes. With a few exceptions, this has not been the case. Although the amount of electricity produced from nuclear energy has increased, the increase has been much less than predicted, and it was at any rate, primarily the result of the completion of those plants which had been ordered before.

There have been few new orders for nuclear plants. In the experience of the OECD countries, with the notable exception of France, there have been either very few orders or, as in the case of the USA, a large number of cancellations of previous orders. [4]

There has also been a slow-down in new construction due to technical, financial and political problems. In the early 70s, for example in OECD countries about 6 years was the normal construction time. This has increased to 7-12, depending on the country. [5]

Projections for future generation of electricity from nuclear sources have also fallen throughout the seventies. The figure here, for example, shows the experience in the OECD countries, where the official projections for 1985 installed nuclear electric capacity have fallen by more than 50% in less than 10 years. [6]

* The impact of nuclear energy on the energy supply and consumption patterns of rural regions in underdeveloped countries is negligible. Consequently, this paper deals primarily with the urban-industrial regions in the underdeveloped and all regions of the industrialized countries. For more details about the energy issues in the rural regions, see *Anticipation* No. 29, November 1982.

Other projections show even steeper decline. Gone are the days when it was expected that one day all energy will be supplied from nuclear sources. Even the advocates of nuclear energy now recognise that this energy option will be only one of many other sources. It is not realistic to think anymore that the *Atomstaat* will take place in the foreseeable future. However the question still remains : what share (if any) should nuclear energy take in the total ?

OECD : PAST PROJECTIONS OF YEAREND 1985 NUCLEAR GENERATING CAPACITY

ecological consequences of mining and burning lignite are considerable. Furthermore, the lignite reserves will only last about 40 years. Thus nuclear energy will have to expand in the middle and longer term.

The churches are now deeply involved in thinking about the ways in which nuclear energy can be responsibly used. The theme has been taken up by seminars, individual parishes, church academies and national church meetings. A major event was the gathering of the *Pastoralkolleg* of the Evangelical-Lutheran Landeskirche of Saxonia in November 1981. Three leading experts from the Rosendorf nuclear research centre near Dresden came to talk with 25 pastors and lay people about nuclear energy.

Such discussions in the GDR cannot aim to question the fundamental need for nuclear energy for the next few decades. Their objective should be to pursue the dialogue between the churches and the representatives of the government and the nuclear industry, so that future nuclear policies become more transparent; fears are reduced and the ethical challenges posed by these developments may be identified. ■

UNITED KINGDOM

The nuclear debate in the UK now centres on the Sizewell Inquiry, which is expected to continue until Autumn. Much of the concern which was apparent at the Windscale Inquiry has now moved over into activity against nuclear weapons.

The British Council of Churches presented a formal case at Windscale which was virtually ignored by the Inquiry Inspector, though quite a lot of interest has subsequently been expressed (e.g. two post-graduate theses, one in Scotland and one in France, have devoted large sections to the BCC's ethical stance).

Since Windscale, the BCC has sponsored a nuclear group followed by a more broadly-based energy group. The nuclear group, which lasted for about a year, considered aspects of the Government's promised Fast Breeder Inquiry (which has yet to materialise). The energy committee, which wound up last Christmas, reviewed national energy policy and also considered the prospects of "grass-roots" involvement by churches in local energy conservation programmes.

The British Council of Churches' Energy Committee and a group of Industrial Chaplains meeting independently decided not to present a formal case at Sizewell. Rather they expressed the view that the churches should monitor the Inquiry and press for a thorough investigation of a number of social, economic and technological issues. Two major points are that the focus has now switched very much to the economic aspects of nuclear power vis à vis both AGR versus the PWR *and* either of these versus less expensive and more labour intensive non-nuclear mixes (with strong emphasis on conservation). The importance of a full parliamentary debate at the end of the Sizewell Inquiry is paramount. ■

Increase in Costs and Reduction in Demand

Just a few decades ago the proponents of nuclear energy claimed that nuclear electricity would be too cheap to meter. Today, on the average, nuclear electricity cost approximately the same as electricity generated from coal with expensive scrubbers installed to reduce the emissions of sulphur oxides. In some situations nuclear can be somewhat cheaper, while in others more expensive, depending on the specific conditions. [9]

Some observers believe that nuclear electricity is shown to be much cheaper than it actually is by not including the cost of the full fuel cycle. It is not clear for example what the costs of final waste disposal will be. Some other externalities of nuclear energy are also excluded from the calculation of cost, such as heavy state subsidies for research and development and the cost of large and expensive accidents, such as the one at Three Mile Island in the USA in 1979.

Construction times of nuclear plants have substantially increased during the last 10 years. One of the most sensitive parameters in the cost of the plant is exactly the time of construction, especially with higher interest rates. According to the OECD experience, an increase in construction time from 6 to 10 years, increases the cost of the plant by about 30%, which removes entirely the possible cost advantage of nuclear over coal. [10]

New safety procedures, required as a result of the study of accidents and faults found in operating nuclear plants have also increased overall costs.

It has also been recognized that the investment required to save a certain amount of electricity is often less than what would be required for its production. This has led to the paradoxical situation of an electric utility (whose business is making money through the sale of electricity) giving bonuses to customers for introducing more efficient electrical appliances!

The consequence of such energy saving measures has been that the increase in electricity demand has been much less than predicted. In the OECD experience, for example, total energy demand fell by 2.8% during 1979-80, and although the electricity demand still increased by 1.3%, it was much less than predicted. [11]

Breeder reactors, which produce more fuel than they consume, and which depend on highly enriched (weapons grade) fissile materials are in even greater trouble. Except for France and the USSR commercial breeders are not planned for the near future. Other countries, such as the USA, FRG and India are continuing some research and development work. It is however increasingly unlikely that breeders will become competitive with conventional reactors.

Recent developments in uranium extraction technology from seawater show that it is cheaper than relying on breeders. Given the fact that the supplies of uranium in seawater are practically unlimited, the justification for the development of breeders disappears. Thus the much feared "Plutonium economy" — a necessary byproduct of breeders — will also probably not come about. [7]

These developments have been very difficult for the nuclear industry, whether privately or governmentally owned. During the 60s and the early 70s a large, costly infrastructure for the production of components needed in nuclear reactors was built up which is now operating often far below capacity. Some may face collapse unless there is an upturn in orders. One of their hopes has been to try to penetrate the market in underdeveloped countries, especially with newly developed small and versatile reactors. Some of the risks and benefits of this has been discussed in detail by the Advisory Group of the Energy for my Neighbour Programme, at its meeting in July 1982. [8]

The factors underlying these developments vary from country to country. Some deserve special attention.

The Legacy of Three Mile Island

There have been numerous accidents in the history of nuclear power. There have also been many instances when grave errors or faults were found in nuclear reactors in construction or already in operation. None, however, had as large and as broad an impact as the accident in the USA at Three Mile Island (TMI) near Harrisburg, Pennsylvania — just a few months before the MIT conference in 1979. Although the accident did not result in a large number of deaths or injuries, some observers claim that a major catastrophe was only 30-60 minutes away. [12] Whether that was avoided through good luck or good design is difficult to say — perhaps we will never know for sure. The fact is that the accident was contained. No major releases of radioactivity took place, except the venting of krypton in the summer of 1980 under uncontrolled* circumstances.

However, the financial cost and the resulting impact on the nuclear industry, the electric utilities and the public have been enormous. The total costs for the clean-up are now estimated to be over US$ 3,000 million (3 billion) and it is predicted that it will take 5-7 years. The utility operating the plant was only insured for $ 300 million, and it is still not clear who will pay the difference. In all likelihood it will be either the taxpayers or the electricity consumers. In either case, the cost of nuclear electricity will be higher, thus exacerbating the problem outlined above.

In July 1982 the United States Nuclear Regulatory Commission (NRC) revised its own earlier estimates of accident probabilities, saying that serious nuclear accidents, such as the one at TMI should be expected every 10-15 years (in the USA) rather than every 200-300 years, as previously predicted in the Rasmussen Report. If this is the case, one would have to include in the calculation of the overall costs of nuclear electricity a figure of approximately 3 billion dollars every 10-15 years! Perhaps there is a clear economic reason why the electric utilities in the USA are no longer so keen to invest in nuclear plants!

The complexity and the potential catastrophes which could be induced by nuclear accidents require that those operating the nuclear plants (i.e. the electric utilities as well as the public regulatory agencies created to supervise them), have the highest technical competence and managerial abilities and that they be thoroughly accountable to the public. As a result of the TMI accident it has become evident that this is not always the case. Both the National Regulatory Commission and the electric utility operating TMI were found to have provided false information, suppressed unwelcome news and did not dispose of the technical and managerial expertise necessary for the safe operation of the plant.

The utility was fined on 17 counts of not following regular procedures leading to the simultaneous failure of a number of independent components, resulting in the meltdown of parts of the reactor core. It has also been shown that the working atmosphere inside the plant, specifically the relationship between management and labour was such that safe operation of the plant was threatened.

All these issues raise the important question of the extent to which the nuclear industry and the public authorities which supervise them are accountable to the public. If the public cannot trust the operators and the regulatory agencies, it will lose confidence in

* The Union of Concerned Scientists as well as some popular pressure groups opposed this venting on the grounds that it might endanger the health of nearby residents. The Nuclear Regulatory Commission, however, permitted the venting.

this energy source. One of the conclusions of the Kemeny study, commissioned by the US Government after the accident, was that unless the regulatory process and the institutions involved were radically improved there would be no future for nuclear energy in the USA.

The Failure of the Non-Proliferation Treaty (NPT)

There are two important aspects of the nuclear proliferation problem which have become more serious in the recent years. The first is the unwillingness of the nuclear weapons states to carry out the article of the NPT which obliges them to reduce and eventually eliminate all nuclear weapons. In fact their nuclear weapons have increased in quantity as well as in quality. This is the single most important obstacle to a revival of the NPT.

The second is the unwillingness of the nuclear suppliers to share fully the civilian aspects of nuclear technology with countries which do not have the technological base necessary for the development of their own nuclear industry. One of the reasons for this unwillingness is fear of the proliferation of nuclear weapons. It is evident that such proliferation might take place but as long as the nuclear weapons stockpiles of the nuclear countries are on the increase they are in no position to preach the cause of non-proliferation!

The conflict is further sharpened by actions, such as the recent revelation in the United Kingdom, that plutonium from a civilian nuclear installation is being sold to the USA for military purposes. [13] Thus the nuclear states themselves contribute to the proliferation of nuclear weapons and to the further erosion of the principle that civilian and military nuclear technology can be seen as distinct.

It cannot be denied that the military and the civilian nuclear technology were born from the same womb. The fundamental scientific principles are the same, and many of the technological processes, such as in the preparation of reactor fuel and weapons materials are the same, and often are carried out by the same company or government agency. Yet they are not the same. There are many countries with civilian nuclear programmes which do not have nuclear weapons, and are unlikely to do so in the future (e.g. Switzerland or Sweden). Conversely, many nuclear weapons states started with nuclear weapons, and then diversified into civilian programmes (e.g. USA, USSR). Yet, it is a fact that a number of countries achieved a nuclear weapons capability (or are thought to have achieved it) after acquiring of a civilian energy system (e.g. South Africa, India).

Given the civilian nuclear capability, it is quite possible (if there is a will) to translate it into a military capability. We should do our best to separate the two technologies and to keep them separate.

Pro or Contra — That Used to be the Question

Many have tried to use ethical reasoning to prove that nuclear energy is against the Word of God on the one hand, or is salvation itself on the other. In between these extremes there has been some hard thinking in churches and religious groups about the ethical problems of relying on nuclear energy. Many of these studies reject nuclear energy on ethical grounds, in believing it to be artificial, against nature and resulting, possibly in a very large number of deaths.

A close examination of the arguments and the rationale behind such a rejection leads to the conclusion that either the rationale is wrong, or that such rejection has also to apply to a large number of other human activities which have equally devastating impacts on nature and on human life. The collapse of a large hydroelectric dam can cause thousands of deaths; chemicals which have been used on crops cause cancer in hundreds, perhaps thousands, of individuals; a malfunction in a computer could start a nuclear war. Clearly, these must also be rejected on similar ethical grounds.

Ethical analysis (which tells us what is good and what is bad, i.e. the principles) has to be accompanied by a more detailed comparative evaluation of specific technological systems, which will have to study the risks, costs and benefits of the different options available. Ethical analyses can tell us that it is unethical to use up all the forests today (e.g. as fuelwood or timber) and not leave any for future generations. Given this principle, the comparative evaluation of a few energy options will show that ethically it is more acceptable to improve forestry practices than to introduce kerosene to try to replace wood as an energy source.

In Sweden there has been a major public debate and a national referendum on the energy future of the country, and about the role of nuclear energy in particular. It was recognized that reliance on fossil fuels and nuclear energy in the longer term, i.e. the "hard path" is not in the common good. It was decided that in the short term a few more nuclear reactors would be built, as a bridge to the future. At the end of their life times (approximately 25-45 years) no new ones would be constructed and they would not be replaced. It is expected that by that time alternative energy sources will be sufficiently well developed that reliance on nuclear energy will not be necessary. This example is striking; the "ethical analysis" showed that nuclear energy is not good, while the "comparative evaluation" showed in the short term it is still a necessary energy source.

In other situations where the resource, technical and financial parameters are different it may be necessary to approach these questions differently. For example, in the case of the Federal Republic of Germany [14] it was concluded that the bridge into the future can be envisaged without any nuclear plants.

It is evident that the nuclear debate has not been resolved. The early euphoria about the promise of nuclear energy has given way to a much more cautious approach, even by the industry and the policy-makers. The quality of the nuclear debate has also changed, now centering more on practical details of the fuel cycle and of particular nuclear installations compared to other available options. Final waste disposal, safety aspects, combined heat and power schemes, impact on employment and other economic issues will dominate the agendas of the churches as well as of the general public for some time to come. ■

Notes and References

1. Report of the MIT Conference on Faith, Science and the Future in *Faith and Science in an Unjust World*, Vol. II, ed. P. Abrecht, WCC, Geneva, 1980, p. 102.
2. Minutes of the Central Committee, WCC, Geneva, 1980.
3. Evidently churches did not necessarily cause these actions directly. They were however partially responsible for them.
4. *World Energy Outlook*, IEA, OECD, Paris, 1982, p. 334.
5. Ibid., page 352
6. Ibid., page 330
7. See discussion in *Anticipation* No. 29, page 14.
8. Ibid.
9. *World Energy Outlook*, op. cit., pages 354-355.
10. Ibid.
11. Ibid.
12. All data for section on TMI was taken from the article by E. Walsh in the March 1983 issue of *The Bulletin of Atomic Scientists*, entitled "Three Mile Island: meltdown of democracy?".
13. *New Scientist*, March 24, 1983, or *The Guardian*, April 11, 1983 an article by A. Tucker entitled "Scientist in Plutonium Row says He Faced Kangaroo Court".
14. See *Anticipation* No. 29, article by Günter Altner, pages 54-60.

JOBS, TECHNOLOGY AND ALTERNATIVE PLANNING

Howard Davis

1. JOBS AND TECHNOLOGY: BASIC ASSUMPTIONS

Against the bleak background of mass unemployment there is a surprising amount of optimism in government circles about the potential of new technology to create employment. New technology is judged to be the precondition for secure employment, even if full employment is not possible in the foreseeable future. The stark message "automate or liquidate" is based on the assumption that when machines replace labour there are tangible benefits in terms of lower-priced and higher quality goods or services and that these create more demand which in turn generates new employment. This is in addition to the jobs which are created by the development, production and distribution of automated equipment. Without automation and increased productivity, it is said nothing will halt the decline into uncompetitiveness.

Some entrepreneurs are equally enthusiastic about the future with robots, on the grounds that they can eliminate much unpleasant work and that there is potential for employment growth in service and leisure industries.

There is a common theme behind these views: the idea that structural unemployment can be overcome by technology-led economic growth. The technology in this instance is the microprocessor, and its applications in the factory and the office. To hold this view it is necessary to make general assumptions about the context in which new technology is applied. If new technology is to generate employment there must be a growing market for goods and services, capital must be invested in labour-using rather than labour-saving activities, and the labour force must be mobile between occupations.

Each of these assumptions is open to serious question. First, enhanced productivity in the production process does not automatically increase demand. For example, nearly all households have a refrigerator and they are unlikely to acquire an extra one simply because fridges become cheaper to buy and run. The size of the market is virtually static. The same is true of many services as well as consumer goods. Second, the predominant trend in capital investment is towards labour-saving techniques, as might be expected, since this is often the shortest route to increased productivity. This strategy has been so successful that, in the long-term evolution of both agriculture and manufacturing industry, the increase in output has been exceeded by the increase in labour productivity, with the result that employment has declined in both sectors. Third, there are many economic, social and psychological obstacles to occupational mobility. They will certainly continue to act as a brake on the spread of new technology.

Therefore, in the current worldwide economic recession which is having a generally depressing effect on economic demand, policies for technological change evoke fundamental questions about the development of demand for goods and services, the precise objects of capital investment, and the role of workers in the whole process.

2. "NEW" ECONOMIC ACTIVITY?

According to some commentators the advanced industrial economics are unlikely to experience growth through consumer product innovation. In effect, they are saying that both manufacturing and service occupations are bound to dwindle in much the same way as agricultural labour has contracted despite vast increases in output. What, then, are the remaining, or new, areas in which economic activity can expand?

Any answer to this question must be speculative, but it is possible to make an inventory of activities which are (a) relatively resistant to automation, and (b) likely to benefit from the enhanced possibilities for communication in the age of the microprocessor. They could all provide opportunities for growth into the 1990s. The following list assumes a modest amount of economic expansion and the rapid implementation of new technologies, resulting in a sharp fall in existing employment in *both* the manufacturing and service sectors.

Social organisation

- Social and economic planning and decision-making
- Research
- Continuing education and recurrent training
- Information provision and processing (libraries, data banks, consultancy)

Production

- Building the new communications infrastructure
- Information systems (esp. software)
- Energy conservation and small-unit energy production
- Materials recycling
- Manufacture of leisure goods
- Architecture and construction, including renovation

Services

- Individual health, welfare and counselling services
- Home maintenance and security
- Individual transport and delivery services
- Provision of food and drink
- Home-based employment, including domestic work and gardening

Leisure

- Arts and entertainment (incl. TV, cinema, radio, etc.)
- Sports, with wider access and participation
- Tourism
- Crafts, hobby-related work and DIY

This list does not depict a future employment structure but merely suggests some of the areas in which growth is likely to occur. They will exist alongside, and develop from, the presently existing patterns of employment. Immediately it raises the issue of whether some or all of these are "desirable", and which of them should be given priority. The point is that a time of change is a time for choices — about the social and ethical aspects of employment as well as the economic aspects. Although the facts of economic life often seem to have a determinate role, the present circumstances (especially a very high level of unemployment combined with

dramatic technological opportunities in microelectronics) are ideal for a re-assessment of priorities. Whilst few would dispute the priority of creating more employment, there are choices to be made concerning the direction of investment, the social impact of particular goods and services, and the level of access which workers have to technology and the extent of their control over it. The dimensions of choice can be illustrated through the examples in the following section.

3. DEFINING PRIORITIES

3. 1. **Arms production and conversion.** Several aspects of military expenditure in the industrial market economies have received attention in recent research. Military spending distorts R & D effort, generates inflation and is inefficient in creating employment. Not least, it inhibits growth in developing as well as developed countries. In the light of this, and the moral objections to militarism and arms trading, there is urgent need to consider the possibilities for arms industry conversion. The detailed possibilities are well illustrated at the technical level by the Corporate Plan prepared by the Lucas Aerospace Combined Shop Stewards' Committee (see "Lucas: an alternative plan"). Less well understood, but of equal importance, are the social and political obstacles to the implementation of such well-conceived alternatives.

3. 2. **Jobs vs. efficiency?** Opportunities for employment have often appeared to exist at the expense of efficiency and productivity. There is a related tendency to search for productivity through large-scale, capital-intensive and technologically sophisticated projects. A good example of this is the energy supply industry. It takes a different kind of framework to see that the efficient management of energy resources can mean additional, not less, employment. In this example, as in arms conversion, it is almost certainly necessary to have central and regional institutions to provide support and investment.

Along similar lines, it is argued that products can be re-designed to meet existing needs in a way which substitutes manpower for energy. This focuses attention on products, especially their "life-span", which could be significantly extended to alter the balance in favour of more labour-using economic activities, without loss of efficiency.

3. 3. **Access and control.** Who controls the process of technological innovation? Not those who have the greatest personal stake in its future — the professional and other workers who design, produce and apply technology to the work process, and the people who buy the products and services. Large-scale, capital-intensive and complex technologies encourage decision-making which is centralised, bureaucratic and guided by the needs of "the system". The result is that the majority of users are alienated from the technologies they use and are vulnerable to manipulation. Where access to technology and control over it is given priority, the results are often promising. However, there are serious obstacles to this extension of participation. The Lucas Aerospace alternative plan foundered in part because it proposed a shift in power and responsibility which the company was not prepared to consider.

4. TOPICS FOR STUDY AND DISCUSSION

Recent studies raise questions about the future prospects of employment, the assumptions behind government policy and a number of practical proposals. It is in the nature of these issues that technical, economic and political questions should predominate, yet discussion cannot take place at all without basic assumptions concerning the use of resources, the meaning of work and the principles of social organisation. For example, most people deplore unemployment, but some have actually abandoned the principle of full employment. The questions which follow are designed to spotlight the issues in a way which is consistent with Christian belief about creation, stewardship, justice and responsibility. Biblical Christian understanding may lead to more than one conclusion, but we must attempt to discern in the present and future patterns of technical and social change those paths which lead towards more wholesome work and more just and responsible ways of allocating it.

1. "Automate or liquidate". Must the social consequences of automation be ignored in the struggle to remain competitive?

2. What are the special responsibilities of government for economic growth and technical change? Are they being discharged?

3. Is there a "need" (as distinct from a demand) for the products and services listed above?

4. How many of these activities are likely to enhance the quality of life?

5. Will it matter if the spread of these activities blurs the distinction between "being at work", "being usefully occupied" and "being at leisure"?

6. How far are the knowledge and skills involved in military production "convertible"?

7. Which aspects of your own occupation are being, or are likely to be, changed by new technology? Do you have any control over this?

8. Do contemporary views about work (i.e. the "work ethic") rest on Christian assumptions? ■

WILL THE WORLD MAKE THE YEAR 2000?

An Interview with József Bognár, the Hungarian Economist

Interviewer Baló: Professor Bognár, I know that you are an optimist, therefore I am not asking you whether the world will make it to the year 2000; but do you believe that the chances of the world making it to the year 2000 are increasing or decreasing?

Prof. Bognár: It is very difficult to give a clear answer to this problem. Those who are pessimistic about the expected development of the world in the next two decades... are speaking of two major problems. One concerns the type of the dangers outlined by

the Club of Rome and other scientific associations. These associations have spotlighted the worsening of the living conditions of humanity, because of economic development that does not take into consideration the biological equilibrium, the environmental problem of water supplies and so on. As far as I can see, in this respect we can note a certain improvement. The average citizen has taken a keen interest in the problems of these living conditions and even governments are paying greater attention to these issues. Higher budget allocations are made by governments for environmental purposes to encourage the hope that we shall avoid an environmental catastrophe. The second danger to life is represented by nuclear arms. In this respect, the situation is not improving. Looking at the great tensions in international life, and the sources of these tensions, there appears to be little reason to expect a quieter world situation. This is all the more clear if we consider the many different new features; problems within the new states and the emergence over the next decade of new economic powers, perhaps like Brazil in Latin America or India in Asia. In fact, a new distribution of power and of the population is coming into existence. As emerging countries become stronger and other countries are weak, then the local equilibrium in different parts of the world can be endangered. These circumstances can lead to local conflicts, particularly if one takes into consideration the fact that the international organizations are not able to find ways and machinery for solving disputes. The international political machinery in this respect is very very underdeveloped, I would say it is even weaker than it was twenty years ago, inspite of the fact that there are many more problems and tensions than in the past.

Baló : One has the feeling that the major powers, first of all the United States and the Soviet Union have lost their capacity of crisis management.

Prof. Bognár : Yes, because you know, the United States is unable to influence in every case the different allied countries. The Soviet Union sometimes does not have the necessary economic power to influence different international situations. That has to be seen within the context of the immense and worldwide arms race. Official statistical data show that about seventy per cent of the best scientific forces in the United States are engaged in arms research. I suppose a similar proportion must exist also in the Soviet Union. At the same time, you must also consider that while 11% of national income will be spent on such purposes by the super-powers, only 1% by Japan or by some other countries. I suggest that because of this keen competition between the two super-powers, other countries can have an increasing role in the different international problems without having the capabilities of the two super-powers in seeking solutions to conflicts.

Baló : Do you believe, professor, that more, or better or more sophisticated weaponry or deterrents make for greater security? This is what is being argued, above all in the United States.

Prof. Bognár : I do not believe it. Because, armaments are no longer controllable in the real sense of the word. Even the concept of a world equilibrium between the United States and the Soviet Union is an absolutely uncertain equation. In the media, they write that, say, in one type of missile the Soviet Union has more than the United States and vice versa. But the question of a global equilibrium is a very complicated problem; for example, you have not only land based missiles, but those which can be launched from the sea. They do not take these elements into consideration in the media when they compare the different control systems and so on. It is very difficult to foresee just what technological development can be anticipated in this respect, or how the various innovations will change even the power relations in the view of those experts who specialize in armament problems.

Baló : Well, here you have a confrontation of opinions. On the one hand public opinion, scientists and various peace movements who want to halt the arms race. On the other hand, governments and defence ministries who demand more and better weapons. Is there any way out?

Prof. Bognár : This is the problem. Beause if I take the classical way of thinking, in power problems, then power is not only arms — you have population, you have territory, industry, underground wealth, etc., which are constant elements of power. So it is not only a question of military power. In my opinion, today people frequently and wrongly equate military power and power as such and within military power, they compare one set of arms systems with other arms systems, which are very different problems in my opinion. In my view, to avoid a nuclear catastrophe, a certain, I would say, minimal cooperation would be absolutely necessary between the Soviet Union and the United States. Without that, if you have a global system in which the two super-powers confront one another, and you have local conflicts, then in every conflict you have at least two parts, one part is going to one super-power, the other automatically goes to the other. Which means that you have an intensification of conflict within the global system. As a result, local problems cannot be solved as long as you are unable to solve the problems in the global sphere. This makes things much more complicated. And that is why I believe that in the present period a certain minimum of objective cooperation on problems within the international political system, and in seeking solutions to conflicts would be absolutely necessary between the United States and the Soviet Union.

Baló : The Seventies were called a decade of detente, one in which relations improved between the Soviet Union and the United States. We have yet to characterize the Eighties, but I believe you would agree that relations between the US and the USSR are now at a new low. Now the Soviet Union believes that this is because the United States has made a right turn under the Reagan Administration. The US has embarked on new armament programmes, it seeks to deploy new missile systems in Europe. The Americans claim that all this is because of Angola, because of Afghanistan, because of Ethiopia and so forth. This would appear to be a vicious circle from which the cooperation you want is excluded. How to break out of that circle?

Prof. Bognár : Well, let us take the example of the emergency situation arising from economies. In this decade, a number of governments, under the pressure of economic circumstances and events have taken political directions they never wanted to follow originally. For example, President Reagan, who started out with a policy of tax reductions and then raised taxes... And some socialist countries have had to take into consideration the world market situation, negative balances of payment and so on and adopt a new economic policy. This very serious international economic situation, which is likely to grow worse from day to day, may exert pressure on the different powers to try to work together to solve these economic problems, which will be very grave in every country. The economic crisis is still extending in every respect, and while in some countries there is talk of recovery and so on, the opposite is happening. You can see in the Scandinavian countries the crisis is much deeper than three or four years ago. Austria, with relative stability, one of the last islands in the capitalist world, is also having problems.

Baló : The socialist countries have their problems too...

Prof. Bognár : The socialist countries also have a lot of problems, and there is the Brazilian problem, the Mexican problem, and many others. International trade is one of the most important factors influencing economic growth, but if you are not able to export because the other party is not able to import more, then these are contradictions that cannot be resolved without cooperation. Four or five years ago, writing in various publications, I suggested the convening of an international economic conference at the level of heads of state. I think it will take a year or two yet before this idea will be accepted. Nevertheless, I believe that

such a summit is absolutely necessary, because this is a third form of catastrophe, which can come and we have to avoid. The danger of catastrophe is clear with growing unemployment and social institutions in bankruptcy. You can read every day of the desperate difficulties of social insurance systems, banking and monetary systems which influence every aspect of life. And no way out of this situation can be found so long as the world is unable to initiate a new economic policy, to adopt a new conception. Perhaps all these factors will generate economic pressure strong enough to influence statesmen towards a greater effort to improve international relations so that some kind of economic cooperation can come into existence. Without cooperation, we shall not be able to find a way out of this deep and difficult economic crisis.

Baló : It is very difficult to understand why of all countries, those of the so-called third world, or developing countries spend more and more on arms, although they have great economic problems and indebtedness to the Western banks. What might be the reason for this ?

Prof. Bognár : You know, this is linked to the local and regional conflicts, which I mentioned earlier. Take the example of the chain reaction when Israel and Arab countries increase their military potential. This is also linked with my point about the global system in which one country goes to the United States for weapons, the other country to the Soviet Union. It brings us back to the global conflict system. At the same time, the countries involved have no possibility to build their economies, to solve the tremendous problems of poverty and underdevelopment. That is why I contend that the world in its present institutional system, in an international situation of having the two major powers in confrontation, is ungovernable in many respects. Because in the past, the world was dominated mostly by one leading power. Today we have two. But to have these two in confrontation in this sensitive world, that is too much. I am afraid we cannot simply overbridge this problem in the present international system.

Baló : There are elite groups in the United States who genuinely believe that a one power world is better and more governable than a two power one. They argue from this standpoint that the arms race is needed because under its impact the Soviet economy will collapse. What do you think of that ?

Prof. Bognár : They make an enormous miscalculation if they suppose the Soviet economy will collapse. The Soviet Union has tremendous possibilities and potential of all kinds, for example in raw materials it has the vast Siberian energy resources waiting to be tapped. Of course, the armaments race and the problems in agriculture — the two main Soviet problems at present — make for difficulties. But that is why the Soviet Union, which wants to solve its domestic problems, knows that complete solutions are not possible without a genuine reduction in spending on arms. In the long run the United States must see that the situation is similar. What will happen if the United States continues to spend on arms at present levels ? One thing is sure, it will lose the position of influence it has always had as a major economic power. Consider the US position in relation to Japan. In that country, one per cent of national income is spent on armaments, scientific capacities are concentrated in the civil industries and not in the military industries, Japanese living standards and production costs are lower than in the United States, and they have 40 or 50 more working days than the West European or the American worker. Now, if one takes these big advantages into account, it is possible to see how the United States could lose its dominant economic role. Although institutionally the weight of the military area may be greater in the United States than in the past, still it is in its character as an economic power that American influence has traditionally operated throughout its history. That influence could progressively decline as in different countries, the economy becomes more important than arms. But I think that for the United States economic power must be the most important element of future policy.

Baló : Yes, but still it is the United States that leads the arms race. It is still the major economic influence. In many areas of science and technology it is still very much ahead of Japan and Western Europe. Now, obviously, because of all this, the United States is a determining factor in the future of the world. Yet I have a feeling the President Reagan has the vision of a past America projected into the future. Which way do you think the US will go ?

Prof. Bognár : There are very complex forces at work which could influence the direction the US may yet take. In my opinion, there is a change in the distribution of political influence within the United States. Traditionally, the East Coast has exerted greater political influence than the South West or the Sun Belt. But a big shift has taken place in the distribution of economic power; in California or Texas, you now have most modern industries, while Pittsburgh has the old metallurgical combines ! These changes have been accompanied by a big migration of population. In my opinion, greater political power is being concentrated in the new areas, and the states in these areas will be decisive in electing the President of the United States. At this moment we do not have a real knowledge about the political capacity or intentions of these new power groupings in the United States. We still see US political affairs in the old pattern of Democrats strong on the East Coast and the Republicans strong in the Sun Belt. Actually, I expect that the next President, independently of Reagan, will again come from the South West. But the influences behind this trend, the new political, so-to-say elite, has still to acquire political experience. Until now, they have been outside of domestic government or more interested in Asian rather than European problems. They do not have enough information, experience; it takes time to learn, to live together with these problems. From that point of view it would be important to increase our activity, political activity among the circle of these political personalities, because they are not yet familiar enough with Europe, European policy and the policy of the socialist countries.

Baló : And we are not familiar with them.

Prof. Bognár : Yes, I am not convinced that it is inevitable for the South West to be more rightist than the East Coast. Why ? Because when you are outside the political stage, you suppose always that you could solve specific problems, that the only reason the problems are not solved is because the government is not tough enough and so on.

Baló : And that means approaching the problems from the right...

Prof. Bognár : Yes, and the new forces come with much greater optimism about their ability to deal with the issues. They have still to develop a healthy political scepticism. This period which can last for two, three, four years, is of course a period of great danger. But I hope that sooner or later these new leading strata will find their place inside the United States and also in world political problems.

Baló : Are you afraid that there will be a nuclear war ?

Prof. Bognár : I do not believe there will be nuclear war. ■

* * *

DID DARWIN GET IT WRONG ?

Charles Birch

The Darwinian theory of evolution is a kingpin of biology. "Nothing in biology makes sense except in the light of the theory of evolution" said Theodosius Dobzhansky. And most biologists agree. Moreover, this theory has influenced man's image of himself and his place in nature more than any other theory in biology. It has even been invoked to support Marxism, capitalism, racism, fascism and atheism. And just when it seemd to be most secure with the triumph of neo-Darwinism, which combines Darwin's ideas with modern genetics and palaeontology, we find it under attack from a number of quarters, on radio and television and in magazines and books under titles such as "Darwin on Trial", "Why Darwin got it Wrong", "Evolution Theory Challenged" and most recently the book by Rattray Taylor (1983) "The Great Evolution Mystery". In 1981 the President of the Royal Society, Sir Andrew Huxley, saw fit to centre his presidential address to the annual meeting of the society on some of these challenges to Darwinism (Huxley, 1982). He referred, amongst other things, to an address of Sir Edmund Leach given to the 1981 meeting of the British Association on the progress of anthropology in the last 150 years. In this address Leach said "Many well qualified scientists of the highest standing would today accept many of Wilberforce's criticisms of Darwin." The reference is of course to Bishop Wilberforce who was confronted by T.H. Huxley at a meeting of the British Association in Oxford in 1860. Huxley's great grandson now finds himself answering the challenge of a latter day champion of Wilberforce !

Why this renewed criticism of Darwinism and what is the relevance of the modern debate to the Christian understanding of the creation ? Before pursuing these questions it is well to remember that Darwinian evolution has been under attack ever since its birth in 1859. Contrary to common belief, the first opponents of it were not churchmen but Darwin's scientific colleagues. The debates that started in the autumn of 1859 saw few scientists supporting Darwin. They felt that the scientific basis for evolution by natural selection was wholly inadequate. It is usually assumed that the *Origin of Species* provided a strong factual basis for Darwin's theory of the mechanism of evolution. It did not. Darwin's argument can be broken down into four elements. First, the rate of reproduction of all species is far greater than the carrying capacity of their environment, hence the "struggle for existence". Second, there is much variation between the individuals of the species. Third, some individuals are better adapted to survive and reproduce than others in the struggle, i.e. they vary in "fitness" hence "natural selection". Fourth, the favourable characteristics of the survivors are inherited and in the course of time this will transform the species. In 1859 there was no doubt that the first two elements of the argument were correct. The remaining two were not solidly based on observation and experiment. They were conjectures or reasonable hypotheses.

The Origin provided a lot of evidence for the theory that animals and plants had evolved. But Darwin recognized that this would carry little weight until he had worked out a credible theory as to how they had evolved. That is why he waited for 25 years before publishing the theory. In the event, what convinced Darwin did not convince his fellow biologists for a decade or more. The main arguments brought against Darwin during this time are ably marshalled by Moore (1979). *The Origin* did provide a stimulus for studies on comparative anatomy and palaeontology and it was these studies which gradually persuaded scientists that evolution had happened. Yet it was not until after 1930 that biologists became persuaded about the Darwinian mechanism of evolution by natural selection. From 1930 onwards mathematical models, observation and experiment provided a lot of evidence in support of natural selection of genetical variation within the species, evidence which even the creationists now accept. What the latter do not accept is that these processes can result in the transformation of one species into another. They claim that no one has witnessed such an event so it does not happen. This comes rather oddly from people who claim that Adam and Eve were created *de novo* in the Garden of Eden. But it is not true to say that no one has witnessed the transformation of one species into another. Dobzhansky (1953) felt obliged to point this out to Pope Pius XII after the Pope had made some such remark to geneticists in Rome. Dobzhansky pointed out that the plant *Raphanobrassica* is a new species created from two other genera *Raphanus* and *Brassica*. It is not only distinct in appearance but is unable to cross with its parental species and is yet quite fertile with itself. It is one of many such examples among plants.

In 1927 J.B.S. Haldane wrote an essay entitled "Darwinism Today". It was headed with a quotation from Hilaire Belloc "Darwinism is dead". He then proceeded to show that Darwinism was very much alive. In 1982 the English evolutionary biologist John Maynard Smith wrote an essay on "Evolution after Darwin" in the London Review of Books which concluded thus : "Those who would like to believe that Darwin is dead, whether because they are creationists, or because they dislike the apparently Thatcherite conclusions which have been drawn from his theory, or find the mathematics of population genetics too hard for them, would be well advised to be cautious lest the reports of his death have been exaggerated."

There are three streams in the current debate about Darwinism. One comes from mathematicians and physicists, a second comes from within biology and a third comes from religious creationists.

The Arguments of Mathematics about Chance

A conference was held 15 years ago in Princeton at the behest of mathematicians on "Mathematical challenges to the Neo-Darwinian theory of evolution". The gist of the criticism is the old one about the monkeys and typewriters; that a thousand monkeys hitting away at random at a thousand typewriters for a thousand or more years would not produce the works of Shakespeare. We all agree. A more modern version comes from Sir Fred Hoyle and Chandra Wickramasinghe (1981) who put the chance of a chance origin of living matter as one in ten to the power 40,000 which is to say impossible. This is an estimate of the chance that 2,000 enzyme molecules will be formed simultaneously from their component amino acids on a single specified occasion — the equivalent says Wickramasinghe of a tornado blowing through a junk yard and producing a jumbo jet. This sort of argument is very quickly dismissed by biologists as it bears no resemblance to any understanding they have of the evolution of life. It ignores the step by step process of Darwinian evolution. What is impossible in one step can be achieved in a succession of steps. The bacterium *Escherichia coli* that contains five mutant genes for resistance to the antibiotic penicillin is resistant to a very high concentration of penicillin.

Now the chance that a single mutation will occur is one in 10^8. The chance that five different mutations will occur simultaneously is one in 10^{40} which is the same as saying it is impossible. Yet by a step by step process we can get five mutant genes in one bacterium. It happens this way. If a hundred million non-resistant bacteria are put in a medium containing a very low concentration of penicillin less than ten will survive. These ten each contain a single similar gene for resistance. These resistant survivors can now be multiplied and millions put in still higher concentrations of penicillin. Again only a few survive. These are those bacteria which have undergone a second mutation and so each has two genes for resistance. Repeat the process in yet a higher concentration of penicillin and after five successive steps we have bacteria that contain five mutant genes. What is impossible in one step can be achieved in successive steps of mutation, reproduction and selection. The same argument applies to the evolution in complex organs such as the human eye. The relevant question for Hoyle and Wickramasinghe to ask is the chance of some far simpler combination of molecules than 2,000 enzymes being formed at any place on earth within a billion years. But it would be absurd to approach even that simpler question on the supposition that complex molecules are a consequence of random coming together of atoms. They are not. There are rules of assembly of atoms and molecules. They are not like inert billiard balls bounding around at random in the universe. They are more like men and women in an old time dance in which firstly each individual gets a partner then the partners form into larger organized groupings until perhaps all the dancers are dancing as one. The more I learn about atoms and molecules the more they look like living entities that have their "likes" and "dislikes" if you will. Indeed it is the conviction of some of us that life could not have originated and evolved if the "building blocks" were the sort of objects that mathematicians juggle with. Atoms and molecules are "subjects" that respond to their environment and are changed with changing relationships to their environment. When you start with the classical notion of atoms as self-contained machines and propose that atoms in brains are the same as atoms not in brains and when you then try to build up a living organism from such atoms you produce a machine. That is the mechanistic model of life which has to be challenged. Alfred North Whitehead (1926, p. 157) pointed this out when he wrote:

> "A thoroughgoing evolutionary philosophy is inconsistent with materialism. The aboriginal stuff, or material, from which a materialistic philosophy starts is incapable of evolution. This material is in itself the ultimate substance. Evolution, on the materialistic theory, is reduced to the role of being another word for the description of the changes of the external relations between portions of matter. There is nothing to evolve, because one set of external relations is as good as any other set of external relations. There can merely be change, purposeless and unprogressive... The doctrine thus cries aloud for a conception of organism as fundamental for nature."

What Whitehead called the conception of organism, Birch and Cobb (1981) called the ecological model of nature. Our book is an attempt to expound this idea as a challenge to mechanism.

The Challenge from within Biology

A second stream in the debate about Darwinism comes from within biology. It is really a debate within the Darwinian framework although the challengers sometimes claim otherwise. Gould and Eldredge (1977) who are both palaeontologists put forward the view that evolution is not a gradual process but consists of long periods of stasis followed by "geologically instant" change. They call this "punctuated equilibrium". Much to their annoyance creationists claim this as evidence for creationism, which of course it is not. The view seems to run counter to the conclusions of the great palaeontologist G.G. Simpson who wrote "Tempo and Mode in Evolution" (Simpson, 1944) to demonstrate that the major changes as well as the micro-changes in evolution are best understood as a succession of gradual changes. It is also well to remember that Simpson said evolution "leaps" as well as "creeps". A critical problem in this debate is that palaeontologists deal in a completely different time-scale to geneticists. A million years to a geneticist are but a day to the palaeontologist. This point is very clearly made in a splendid article on the subject written for everyman by Rensberger (1982) which goes somewhat as follows. Under strong natural selection a new species could probably evolve in 50 to 100 generations according to geneticists. By contrast Gould and Eldredge allowed that as much as 100,000 or more years could be considered a brief period of speciation. Even in a long-lived species this is enough for 5,000 generations. A species that took 100,000 years to evolve would be considered by palaeontologists to have appeared almost instantly. The layers of rocks that preserve fossils are formed in such an irregular manner that 100,000 or sometimes even a million years can fail to be preserved. On the other hand, geneticists who work with fruit flies that turn over many generations in a year and produce new varieties with ease would consider any change taking 100,000 years as excruciatingly gradual. Gould and Eldredge consider 100,000 years is an instant compared with several million years of stasis that may ensue. Furthermore, what appears to the palaeontologist as stasis may be anything but that for the organism (since the palaeontologist only looks at hard parts). John Maynard Smith to whom I have already referred considers that punctuationist views will prove to be a ripple rather than a revolution in the history of ideas about evolution. His view is well argued also by geneticists Stebbins and Ayala (1981). A more important controversy within biology concerns the extent to which genetical changes that occur in evolution are adaptive or neutral. It seems, contrary to earlier views, that genes can accumulate in the organism that may have little adaptive significance. The issue is the extent to which this happens. This is still a matter of experimentation and discussion. It is an example of how the details of neo-Darwinism change every year.

The Creationists

A third stream in the debate comes from the creationists and more especially from the Institute for Creation Research in San Diego and the Creation Research Society. Evolutionary theory and particularly Darwinism are charged with being a root cause of the disintegration of valued institutions: the family, morality, religion, even science itself. This is the stated reason for the creationists' campaign against evolution. It features strongly in the propaganda of the Moral Majority in the US against evolution. However, the real reason is that evolutionary theory runs counter to a literal reading of the first two chapters of Genesis. Creationists are out to try and demonstrate that evidence biologists use to support the theory that living organisms have evolved is not evidence at all. A well known example is the booklet by Duane Gish *Evolution: the Fossils Say no.* It is extremely difficult if not impossible for people who are not palaeontologists to make any judgment at all on what the fossils say. An implication of the theory of evolution is that there must have been transition forms between species and other groups of organisms. In Darwin's day there was almost no direct evidence of this at all. Since then many gaps have been filled. There are, for example, good transition fossils linking the classes of vertebrates: fish, amphibia, birds and mammals. Gish denies that there are any transition forms. For example, *Archaeopteryx* is regarded as a transition between reptiles and birds. Gish says it is a bird. Unless one knows the details of skeletons of birds and reptiles it is impossible to know who is correct. The exercise in this particular case has been done for the general reader by Ruse (1982) in his excellent book *Darwinism Defended* (p. 312); *Archaeopteryx* is a transition form between reptiles and birds. In Darwin's time there were few known transition forms. Today there are many. Yet there are also many gaps. Indeed, it is practically the rule that transition forms between

the orders of animals (Primates and Marsupials are orders of mammals) are unknown. But this does not imply that transition forms never existed. A full discussion of this problem can be found in Simpson (1953).

Until recently biologists felt they had better things to do than answer the creationists. That has now changed. A flood of books has begun to appear on the subject of which the first are Kitcher (1982) and Newell (1982). The reason for the change is the increasing number of supporters for creationism in the US (probably more than half the adult population), and more especially their efforts to have legislation changed in some two dozen American states enabling creationism to be given equal time with evolution in biology courses in high schools. John A. Moore (1975) is, to my knowledge, the only evolutionist who has pursued the problem of what equal time for creation and evolution would involve. He carefully analyses the problems raised by interpreting Genesis literally and concludes that if the creationists were rigorous about this they would destroy their own case.

In the early phases of the debate creationists argued that creationism was a science; they called it creation science. However, since a Federal judge ruled that creationism was not a science (*Time*, 18 January 1982, p. 31) they have changed their tune. Now they argue that neither creation nor evolution are science. They are philosophies or religions. The issues here are quite complex for they raise the question — what is science? There are lots of views about that. Without pursuing that question here I can happily refer to a fine discussion of the issue in the context of creationism by Kitcher (1982) in *The Abuse of Science: the Case against Creationism*. This is a scholarly book that contains an excellent discussion of the distinction between science and pseudo-science. A history of the American controversy is given in Ruse (1982), Newell (1982), Numbers (1982) and Kitcher (1982). The journal *Creation/Evolution* (P.O. Box 146, Amherst Branch, Buffalo, NY 14226) provides useful material for teachers and others on the evolutionists answers to specific issues raised by creationists. For those interested in pursuing a non-literal interpretation of Genesis the following are helpful guides: Baker (1979), Koch (1979), Richardson (1959) and Westerman (1974).

The creationist campaign is not simply a campaign against evolutionary biology. It concentrates an attack on the whole of science. In order to accommodate science to creationism the creationists have to change the meaning of the 2nd law of thermodynamics, the constancy of speed of light, the established means of ageing the earth and its rocks and as well the meaning of what is a science. This is what "creation research" is all about. It would imply a rewriting of textbooks in science. Indeed they already do this in biology. The campaign has also influenced the content of non-creationist biology texts. Many publishers now soft-peddle evolution for fear that their books will not be sold in the southern states of the US. The influence in education has been bad. Yet there is one small redeeming feature. Evolution has been and still is taught dogmatically in many institutions. One textbook I recall starts with the sentence "All life has descended by transformation from one original form of life". This is a hypothesis for which there is considerable evidence. It is not an irrefutable fact. Students are easily misled by such statements. We can state the facts and then indicate that evolution is a framework within which these facts comfortably fit, at least for the time being. The same approach can be and should be made to the theory of the electron, to relativity and all other broad-scale theories in science.

The Real Challenge to Science and to the Churches

Darwinism, despite the title of Darwin's great work, is not primarily about the origin of species. It is about the origin of the adaptive diversity of life. That is the central question of biology. How is it that plants and animals are so beautifully adapted, some to live in the depths of the oceans, others on the tops of high mountains, some in hot springs, others in frozen seas? How is it that an orchid that grows not far from where I am writing has flowers that for all the world look like a wasp that lives in the same region. When the orchid flowers in January the male wasp emerges from its pupal case in the soil and goes in search of a female wasp. But there are none to be found as they emerge later. What it does find is the orchid whose flower looks like a female wasp. Indeed the flower is such a good mimic of the wasp that the male wasp mates with the orchid, carrying the process to consummation. At the same time it pollinates the orchid with pollen from another flower. Not only does the flower look like a wasp it also gives off an odour which attracts the male wasp. Such adaptations of plants and animals have puzzled man from time immemorial. Darwin's theory is an attempt to provide a scientific explanation of them and as such has been highly successful.

However the way Darwinism is taught is another matter. More often than not it is presented as a completely mechanical procedure in which chance and chance alone is the predominant feature. All that such a procedure could produce is machines, if even that. An extreme statement of this sort of presentation is made by Monod (1972, pp. 137 and 167).

"Our number came up in the Monte Carlo game... man at last knows he is alone in the unfeeling immensity of the universe, out of which he emerged only by chance."

Because chance plays a role in evolution and in life is no reason for supposing that it has the only or even predominant role. There is chance and there is purpose. Indeed purpose and choice of the evolving creature play a role in its own evolution. The creature creates its own environment. And at a deeper level, if we are willing to grant that living organisms and indeed their constituent molecules are subjects as well as objects, then purpose has a major role to play in evolution and in livingness itself (see Birch and Cobb, 1982). But science has failed to make this clear. It has failed to bestow values on the facts with which it deals. It too readily reduces the universe and the human, to contrivance or machine. Yet we know ourselves to be sensitive, feeling, responsive creatures. Darwinism explains much. But the full development of the aesthetic and moral sense and the capacity for abstract thought still elude its grasp. The Einstein's, the Leonardo da Vinci's and the Suffering Servant do not fit easily into the scheme. Nor does Darwinism together with classical physics and chemistry account for the evolution of consciousness. On the basis of classical physics and mechanistic biology all that need evolve are mechanical robots without consciousness. The existence of consciousness in ourselves raises questions that a mechanistic physics and a mechanistic biology cannot answer. They cry aloud for another model which will yet be faithful to the facts of science.

Because science fails to bestow values on the facts with which it deals it has contributed to a worldwide malaise, a sense of meaninglessness. Furthermore, it is plain for all to see that scientific rationalism has failed to solve our major problems. In the name of scientific objectivity scientism gives an emasculated vision of the world and all that is in it. The wave of anti-scientism from creationists and various cults and sects is an extreme response to this more widely felt malaise. And, as Dorothy Nelkin (1977) points out in her book on the textbook controversy, the loudest advocates of creationism are not from uneducated backgrounds. They tend to be middle-class technically trained citizens. She refers to the "paradox" that fundamentalist beliefs tend to flourish in those parts of the US which have recently become centres of industries of high technology such as southern California and Texas. Our technological rationality is letting people down.

It is not enough for science and rationality to expose pseudo-science, false mythology, religious obscurantism and superstition. It has to do more than just clear away rubbish. Somehow we have to show that science deals with subjects, with entities that feel and

respond and anticipate and are thereby creative. We have to show that the scientific experience and the aesthetic and religious experience can be integrated into a richer vision of life and its purposes. Science has failed to do this and so have the churches. We live in a schizophrenic world of our own making. It is time for the churches to wake up to the great opportunity this crisis of thought and life presents to them. The alternative is to shut its doors to the world. And science too has to look to its laurels. I agree with Catherine Roberts (1982, p. 180) who wrote "... there is something inherentely askew about the present thrust of biology and medicine that needs to be put right. This view rests on the belief that mankind is entering a new age that will demand of the life sciences something quite different from what sciences are now prepared to give. The future contributions of the life sciences will be more holistic and more enabling than any that are being made now." And "A truer, more holistic vision of the universe and its different levels of reality requires insight that can relate science to questions of good and evil and final cause. Nor can scientific investigation long survive without a more fully developed conscience." (Roberts, 1983, p. 8). Both science and religion need liberation. That's a task for science and the churches. ■

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FAITH, SCIENCE AND THE FUTURE: THE AFRICAN CONTEXT

Dr. K.C. Anyanwu

The vast majority of the African people, even the ruling classes, have no awareness of the scientific conceptions of nature, humanity and God and how these affect them. They know that things are no longer as they used to be, that their environment, society, governments and inter-personal relations are changing, that new methods of doing things call for new responses. In the midst of this change, they experience frustration, insecurity and uncertainty, and because of the global systems of "hook-ups" and "plug-ins" it is possible for all nations to share collectively the frustration, insecurity and uncertainty of the change whose primary element is science. As a result, all nations and peoples begin to suspect that the welfare of every nation and every individual depends on the welfare of all; that unless the good life is shared by all, no nation and no individual will fully enjoy it. In a religious sense, all people share in the present sin and it is impossible for anyone to exist apart from others.

DEFINITION OF THE PROBLEM

There have been crises of great magnitude in the past (famine, plague and natural disasters), but our present crisis seems more profound because the widening rift between faith and science has divided or threatened the unity of our selfhood. We have increasingly more power without becoming wiser. We can no longer depend on those ancient binding associations and customs. As a result there is a loss of the sense of direction and purpose.

Historical changes have often been interpreted in terms of economic and political, social and religious, military and ideological facts. But I invite you to consider all these factors as the manifestations of psychic dissociation, tension and imbalance. This imbalance leads to distorted views of humanity, nature and God, a distortion that is more acute in the highly technical nations of the West than in African societies though the latter are catching up very fast. If we could discover a principle of psychic integration to unify our faculties and tendencies, if we could persuade or convince all nations that the new frontier of the new age lies in their spirit not in space, then they might become aware that the bewildering events experienced today are a warning to them that they can no longer direct, control and explain their vast material knowledge, the meaning of life and the destiny of humanity...

In spite of their different areas of specialization academies and experts have one thing in common, namely, applied research. They are searching for information that would increase material output and consumption so that by making more profits, more money may be given for the accumulation of more information to aid more output and consumption, *ad infinitum*. This is why modern education lays emphasis on skills, empirical data, measurement, confidence in figures, distrust of general ideas especially when these demand personal adjustment and obligations. The consequence of this tendency is a general refusal to scrutinize basic assumptions about nature, humanity and God. If "philosophy

as a university discipline commands no authority today in continental Europe" [1] and if the Western nations have proclaimed that "God is dead" [2] and that we can now create a culture without God, what do you expect of the African nations which, under present circumstances, are not nations of thinkers (or philosophers) but imitators of alien beliefs.

Almost all the African experts and specialists, the products of European schools and enlarged copies of the European ego, believe that philosophy is irrelevant in the development of their nations. If, for example, the European leaders know little or nothing of modern science, its world-outlook, its conception of man and its principles that have become part of modern culture, how would you expect the African leaders, whose nations have taken no initiative in science, to know the pictures of nature, humanity and God which science paints? One may respond that the African people should think for themselves, determine their own goals and control their own destiny. But the Western nations tell us that they have discovered beliefs, ideas, modes of thought, standards of good and evil, that are universally valid for all people, at all times and in all places. Any African who calls for the development and application of African cultural beliefs and thought pattern will be ignored, if not hated, by African and Western experts.

The African situation is especially problematic because our peoples have taken no initiative in the development and control of science and technology. Their own cultural beliefs no longer serve as guides to action and the new ones they have borrowed (without understanding), cannot establish order. They are waiting for the West to suggest new beliefs, ideas and modes of association for them to borrow. For how long will the African people see with eyes that are not their own and pursue the heaven that is not their heaven, just for the opportunity to develop technically? "Where there is no vision, the people perish." Keen observers of human history in the West know that the nations which are not intellectually alert and discerning cannot be revolutionary. But economic and political interests have compelled the European nations to flatter the African people because the latter want to be flattered. History, as we know, flatters no one. We, Africans, have been influenced by such contradictory ideas in religion, politics, science, economics and education that we do not know which of the ideas is right or wrong. Only by comparing the alien influences with the African traditional beliefs can we get some clear picture of the nature of our psychic conflict.

We need a profound shift of perspective from the European standpoint in the discussion of the African traditional faith in nature, humanity and God. And the African must also alter his perspective if he wishes to understand the Western mindset... Heisenberg noted the important revision in man's conception of the universe and his relation to it, a revision that affects man's destiny as well as his ability to control his own life. He wondered how the new mode of thinking which the West has created will affect other parts of the world. In his view whether we like it or not, modern ways are going to alter and in part destroy traditional customs and values. It is frequently assumed by leaders of non-Western societies (and often also by their Western advisers), that the problem of introducing modern scientific instruments and ways into Asia, the Middle East and Africa is merely that of giving the native peoples their political independence and then providing them with the funds and the practical instruments. This facile assumption overlooks several things: first, that the instruments of modern science derive from its theory and require a comprehension of that theory for their correct manufacture or effective use. Second, the theory in turn rests on philosophical, as well as physical, assumptions. These philosophical assumptions generate a personal and social mentality and behaviour quite different from, and at points incompatible with, the family, the caste and tribally centred mentality and values of the native Asian, Middle Eastern or African people. In short, one cannot bring in the instruments of modern physics without sooner or later introducing its philosophical mentality, and this mentality, as it captures the scientifically trained youth, upsets the old familial and tribal moral loyalties. If emotional conflict and social demoralization are not to result, it is important that the youth understand what is happening to them. This means that they must see their experience as the coming together of two different philosophical mentalities, that of their traditional culture and that of the new physics. Hence, the importance for everyone of understanding the philosophy of the new physics. [3]

The educational set-up in African nations is not geared towards the understanding of the world of ideas and the consequences of ideas on human conduct but towards the acquisition of scientific and technological skill and techniques for "nation-building". When some Africans make the attempt to clarify the basic assumptions governing the African and the Western culture and the contradictions between the world-views suggested by those assumptions, they are told by their professors and theologians that "philosophy is philosophy", that "theology is theology", meaning that the Western views of nature, humanity and God are the same as for the African people; that the basic assumptions of reality and the method which the mind follows to grasp what it considers as the trustworthy knowledge of that reality, do not differ in both cultures. Those who entertain these beliefs merely establish errors as the principles of progress.

THE AFRICAN CONCEPT OF HUMANITY

Nobody can live without conscious or unconscious assumptions about the nature of humanity, God and the world... African religion is not merely a belief in God, in divinities and in ancestors, but a world-outlook, an endeavour to understand nature, humanity and God. It offers answers to the questions of the origin, meaning and purpose of human existence...

The African concept of the human being arises from the belief that he or she is the product of divine creation, a spirit-force, that though he/she belongs to two worlds ("this world, and another world"); the human being is everywhere and at every point in contact with living forces in action and interaction, in transformation and transmutation. At the peak of the hierarchy of force is God, the Creator of all forces.

Nature is a living-force though not conscious, and humanity is inseparable from it. "Man is not a passive element in the rhythm of nature. He participates in the mysterious force which keeps the universe going." [4] The visible and the invisible worlds are not two separate and independent realities but a unitary process, one aesthetic continuum. "The invisible world is symbolized or manifested by these visible and concrete phenomena and objects of nature. The invisible world presses hard upon the visible: one speaks of the other, and the African people 'see' that invisible universe when they look at, hear or feel the visible and tangible world. This is one of the most fundamental religious heritage of African peoples." Nkrumah further explained the relationship between the visible and the invisible world by saying that "the dialectical contradiction between 'inside' and 'outside' the world was reduced by making the visible world continuous with the invisible world. These African societies did not accept transcendentalism, and may indeed be regarded as having synthesized the dialectical opposite 'outside' and 'inside' by making them continuous, that is, abolishing them." [5]

What distinguishes the human being from Nature is the spirit, and spirit manifests itself through the power of words, thought, feeling, memory. Spirit embraces the power of beliefs, ideas and purposeful activities. It sees the individual in the light of the whole, confers name or meaning to things and creates a community of faith or meaning. Community is not something to be attained in the future by organizing individuals. Rather, every person is born into a community and has to manifest the spirit of community in

him or her by sharing from collective beliefs, works and rewards. The community is not limited to the present members but embraces the past and the future generations.

The African religion does not offer the idea of man as a product of two incompatible principles, body and spirit; or as an autonomous entity separated from nature, man, God, community. Rather, he is a unitary man always in relation to Others. The central purpose of this faith in his or her conduct is to maintain and strengthen his or her relationships with Others. Good and bad acts are those which strengthen or weaken the relationships respectively. Because the African possesses the power of words, the power that grows with age and experience, he creates meaning and values by maintaining active and variable relationships with God, divinities, nature, family, community. Thus, the African religious faith equips the people with conceptual tools to find their bearings in the world. Such tools enable them to appraise the past, appreciate the present and help in suggesting the future. The spirit-symbol called ancestor integrates the individual mind and conscience with the social mind and conscience, and elevates both to the realm of ideals beyond conscious underlying. African political leaders, artists, educators have experimented with the African faith in the unity of God, life and the world.

For the African to realize the imperative of his faith, self-discipline and self-sacrifice were necessary. They were accepted not from without but from within. Self-sacrifice, the giving up or losing oneself to powers and values beyond oneself, entails a lot of pain and a lot of reward. It exhibits the character of a people, reveals what a people desire and what they least esteem. To maintain and strengthen his relationships with God, divinities, ancestors, family, community, nature, was a heavy burden the African imposed on himself. But he was fully aware that there could be no living without sacrifice, that if it was not freely chosen and executed circumstances would rudely impose it on him.

The spirit of faith which molded him and created his civilization did not lay emphasis on external expansion but on inward growth. As that spirit embodied its beliefs and aims in institutions, human groupings and cultural works, it provided a framework to support the growth of personalities. Through the initiation rites, individuals passed from one level of life to another and were made aware of their duties as well as obligations. Living a cooperate life in the environment that guides the development of personalities, the African believed that no isolated individual could develop himself as a whole man. In fact, an isolated individual is spiritually dead. Without these acts of faith, his life would be debsed.

The question of causality did not give the Africans any problem. Events came from God, affected Nature and spoke to them directly or indirectly. There were experts to interpret what the events meant and to prescribe solutions. But the most important thing was that when things went wrong in their lives the Africans did not change the external world but their inner selves. God was not only above but within their world. He spoke to them and looked into them. The space or heaven above them was like a dome enclosing all lives. Within this world-picture; God, man, nature, divinities, ancestors, were constantly interacting. Thus, the Africans know themselves in the scheme of things, their power and their limitation.

ALIEN INFLUENCE ON THE AFRICAN PEOPLE

The change that has occurred in the African world today did not originate from within but from without. For example, the African societies did not produce any Copernicus to break the boundary of their universe, a Columbus to break the boundary of the earth, or a Luther to break traditional religious vows. In contact with the European beliefs, administration and organization, or the Islamic faith and army, the psychological background of the African ways of life was displaced. The success of foreign missionaries, whether Christians or Muslims, was not essentially due to the superior beliefs or convictions of their faith but to military conquests and the control of political and economic power over the African people. The displacement of the African power structure automatically affected the intricate web of African world-view and world-viewed. Public opinion in the African community, a very powerful force that maintained the whole system of values, beliefs, institutions, rules and prohibitions, was destroyed. Because such public opinion does not exist or is weak today, the old convictions of right and wrong, of what it means to be human, cannot be carried into the new environment.

The administrations from Europe brought missionaries and schools, teachers and bureaucrats, guns and capitalism, all based on different assumptions about God, man and nature. It is the intricate interaction of all these factors, not one alone, that explains the force responsible for the change of orientation in African culture. And what is the direction of change necessary for common and coherent action? Here, alien creeds have introduced confusion and contradiction in aims or purposes. Christianity teaches that man's chief purpose on earth is to prepare for eternal life after death. Science teaches that man is a product of unconscious and inert matter without meaning and purpose. Materialistic philosophy teaches that progress is infinite. If this is the case, the world would never end and, by not ending, Christ would not come again.

Direct actions of the colonial governments, teaching in schools, missionary activities, changed the balance of power between the individual African and his community, the chief and the society, by altering social ideas and ideals, economic and legal structures. But the greatest influence which Asia and Europe exercise on the African people comes from the power of beliefs and ideas which now controls the minds of most African people.

MODERN AFRICANS

Modern Africans, the product of the Western belief-systems, ideas, thought and modes of organization, are essentially alienated Africans. Of all the beliefs and ideas modern Africans hold, which ones are their own and why do they hold them? This question has not occurred to the African elites and anyone who puts it to them would be regarded as a threat to their proclaimed authority... Modern Africans still think that once they have borrowed ideas and ideals, got them down on paper and have legal acceptance, they have attained their goals. This is why their faith in the blessings of science, technology, democracy, socialism, education, is equalled only by their vagueness as to what these really mean and entail.

The Africans today do not possess common purpose. All we observe are foreign creeds and ideas competing to gain the allegiance of the African spirit. The confusion that ensued in this process is embodied in all our institutions and behaviour. Take the case of our universities, supposedly the highest institutions of learning and enlightment, in any nation. They are all vulgar and inauthentic because their activities are mere behaviour by prescription hence devoid of inner compulsion. Their intellectual climate frustrates all ambitions and paralyzes all initiatives because each one of them must think and operate in terms of the "mother country" that inspired it. You may find able individuals in those universities but the universities lack originality. They lack originality because modern Africans have no beliefs, ideas, experiences, that may be called their own.

Take the case of science education in the African universities. Our science education means the memorization of scientific formulae and laws, the working on mathematical problems so as to arrive at the established answers. In other words, we teach science within the existing scientific paradigms, but do not know the consequences of these on man's view of himself. To put it in

another way, we are studying science as a matter of technique without studying the philosophy of science as a mental or intellectual creation.

PROTESTANTISM AND PROGRESS

The most scientific, technological and industrialized nations on earth are not the "orthodox" religious ones (the Roman Catholics and the Muslims) but the Protestants. The countries of the "Third World", for example, are excessively religious in the sense that they are not nations of free thinkers. Perhaps the most conservative influence on the African people is Islam because, compared with Christianity, its book, the Koran, lacks commentaries. Its truth is supposedly beyond rational scrutiny.

The "Third World" cannot develop scientifically and technologically without subverting or reinterpreting its religious faith, that is, reassessing the relationship of God, man and nature. This was what Protestantism did, for better and for worse.

In the ideas of Copernicus, Kepler and Galileo, the space which enclosed the religious man was regarded as an infinite void and subjected to mathematical calculation. How could man have vital relationship with infinite void or nothingness? Initially there was no conflict between the study of Nature and faith in Scripture since God was held to be their author. So, the truths of Nature and of faith remained in harmony.

With Galileo, a radical view set in. Natural theology, once regarded as a preamble to revealed theology, became the basis of religious knowledge. Nature became the clue to history, not vice versa. The unclear or ambiguous passages of the Scripture were interpreted by the clear results of science. Mythology gave way to conscious reason and calculation. Eventually the conscious knowledge of Nature replaced the Biblical understanding of revelation. Galileo did not consider himself as an irreligious person. Rather he was shifting the centre of emphasis in man's perspective from God to Nature.

God who was regarded as the Final Cause of all things, a supreme Good toward which all things strive, was replaced by God as the First Cause. In other words, God is just the initial link in the chain of efficient causes. With Galileo began a development where God became merely the original creator of interacting atoms (inert materials) in which all subsequent causality (the emergence of mind, spirit, thought) resides. Nature was no longer dependent on God but, once created, became self-sufficient and independent...

Due to the new world-view... the distinction between heaven and earth, the incorruptible heaven and the corruptible Nature, was abolished. Mankind was demoted from the centre of the universe to a peripheral planet. In Galileo's world-view, man became a stranger in the universe of lifeless particles in motion. It was this world-view that Newton and his followers fully developed.

THE AGONY OF WESTERN AND OF AFRICAN HUMANITY

The Western man, the author of the modern revolution in science, experiences more spiritual agony than the African. This is so because the modern European once believed in prophets, then philosophers, then Kings, then in reason, and now does not know what to believe in. To suppose that he would return to the traditional God he doubted is almost impossible. The African, on the other hand, still believes in God, in science, in technology, in democracy, in socialism and in divinities. His problem is that he has not reflected on the foundations of his beliefs and to do so would land him in despair. But his state of "happy ignorance" has nothing worthy of emulation. The African like the dying European humanist is searching for something to believe in, anything at all, but none of his beliefs offers him security...

With the modern emphasis on reason and the suppression of emotion said to be inferior to reason, modern humanity fails to develop the whole self. Christianity and African religion require a kind of mythological mind for their survival. But the modern world-view, a thorough rational picture of the world, cannot be approached with a mythological mindset. If the Africans still have emotional attachment to Nature and land it is because they do not see these things from the modern perspective. "The main trend of human development is in the direction of the increasing differentiation of thought and behaviour, and of the resulting heightened dominance of man over his environment." [6] In the African case, we do not find increasing differentiation in human development solely because the African societies are not rationally and technologically organized. Religion still permeates the activities of the states and of individuals. The fragmentation of the whole man into economic man, the voter, the consumer, the salesman, the proletariat and the bourgeoisie, has not been accepted as the true picture of what man is and should be.

The African people have seen how the Western man's knowledge of Nature has opened up an immense field for inventions of practical usefulness in commerce and industry. Faith in science seems the most powerful faith the Africans possess today. In pursuit of this effort, the leaders are redoubling their efforts. This is why they relentlessly pursue a course of action in which they eventually fail. Faith in science is something provisional and precarious. "Every scientific theory", according to Spengler, "is a myth of understanding about Nature's forces, and everyone is dependent through and through, upon the religion with which it belongs." [7] Some African elites rejoice because science tells them that man originated from Africa. Science merely studies animal evolution with the serial order from space, time and causality though it does not claim to know what these mean. Nobody can take an oath that man originated from Africa. If science succeeds in rearranging events with the serial order of space, time and causality, if it can measure the events accurately, it claims to know them. "... In the Faustian and the Faustian alone, every theory is also from the outset a working hypothesis. A working hypothesis need not be 'correct', it is only required to be practical. It aims, not at embracing and unveiling the secrets of the world, but at making them serviceable to definite ends." [8] The Western rationalists "imagined that their desire was to 'know God', and yet it was the forces of inorganic Nature, the invisible energy manifested in all that happens, that they strove to isolate, to seize, and to turn to account." [9] And from the Faustian standpoint, "all great discoveries and inventions spring from the delight of strong men in victory. They are expressions of personality and not of the utilitarian thinking of the masses, who are merely spectators of the events, but must take its consequences whatever they may be." [10]

More and more research into atomic structure has revealed an incredible world to the European. He does not understand it, but he knows the working hypothesis of the natural forces. And by touching a switch, he can unleash a force of trillions of horsepower. To achieve prestige, immortality and renown, not necessarily power and profit, the Western peoples export technicians, to the non-European nations. In the end, those nations turn the Western tools against the West. The Africans want science and technology not because they cannot live without them but as a weapon for self-liberation from the West. Whether the Africans achieve their goal or not, it is quite certain that the Western man would still dictate the direction and the pace of scientific breakthroughs.

We see today that old religious beliefs in Africa no longer serve our widened and new experiences while the new religions alone cannot bear the burden of organizing African life.

We must abandon the idea of converting the African to Christianity and Islamism as the only route to salvation. What we should do is find out what God, salvation, redemption, life mean for him in his human condition and experience, the relevance of

and necessity for a complementary view of the African and the Christian faith. "Christianity should not be equated with the Bible. Long before it had a literature, the faith had shown itself a triumphant and transforming power. Christianity is thus greater than its documents. The convincing evidence of the truth of Christianity is the way it meets the needs of human nature." [11] Faith and understanding presuppose that man is not thrown entirely upon his own resources. Man's search for knowledge and God's disclosure should be complementary. This is why the Augustinian synthesis, "I believe that I may understand" conceded legitimate right to faith and reason.

The Africans would not find it difficult to give faith and science their due rights inasmuch as both are forces that strengthen life. They will understand that whatever is hostile to life is wrong. But will Europe accept the religion of renunciation and integration? What should she do with the foreign lands and property she appropriated by force and defends by force? Will the future well-being be built on injustice? Our knowledge of religion or faith today can no longer be considered merely as a belief in God but as the embodiment of people's desires, hopes, interests, values, expectations and ideas. Crusades, wars, missionary efforts, came from religious zeal. Will faith, in the future, be capable of establishing the love of one's neighbour?

Humanity still has a choice and perhaps may choose to transform itself and live. It is precisely the inner transformation of man through faith that will transform the world. And we hope that this faith will be possible. ■

Notes

1. Carl Friedrich von Weizsäcker, *The Unity of Nature*, Farrar, Straus, Giroux, New York 1980; p. 26.
2. "Is God Dead?", *Time Magazine*, April 8, 1966; Vol. 87, No. 14. Though Nietzsche proclaimed the death of God, the death-of-God comprising of Thomas J.J. Altizer of Emory University, William Hamilton of Colgate Rochester Divinity School believes that God's death is now absolute. The Princeton theologian Paul Ramsey remarked that "our's is the first attempt in recorded history to build a culture upon the premise that God is dead."
3. Werner Heisenberg, *Physics and Philosophy: The Revolution in Modern Science*, Harper and Row, New York 1962; pp. 2-3.
4. T. Theuwss, "Rites et religion en Afrique", in *Revue du Clergé africain*, 1965; p. 237.
5. Kwame Nkrumah, *Consciencism*, Monthly Review Press, New York 1964; p. 12.
6. Lancelot Law Whyte, *The Next Development of Man*, The Cresset Press, London 1944; p. 121.
7. Oswald Spengler, *Man and Technics*, Trans. Charles F. Atkinson, Alfred A. Knopf, New York 1960; p. 82.
8. *Ibid.*, p. 82.
9. *Ibid.*, p. 83.
10. *Ibid.*, p. 87.
11. G.R. Cragg, *The Church at the Age of Reason*, p. 249.

A STATEMENT OF SHARED CONCERN

From: The State of India's Environment 1982 — A Citizens' Report Centre for Science and Environment, New Delhi

With efforts to conserve the country's ecological bank still minimal, India is rapidly becoming a vast wasteland. Indians cannot now close their eyes to this continuing degradation of their natural environment.

As this report shows, the list of environmental problems is too long and the human costs of environmental degradation just too high to allow for any complacency.

It is false to argue that environmental conservation acts as a brake on economic development. On the contrary, the experience gained in the last three decades has convincingly shown that there can be no rational and equitable economic development without environmental conservation. Environmental degradation invariably results in increased economic inequalities in which the poor suffer the most. Environmental degradation and social injustice are two sides of the same coin. The human condition and the state of the environment are closely related to each other.

The kind of economic and social development we want will ultimately determine whether the environment will be conserved or further destroyed. For human beings the environment is not just a pristine collection of natural entities that must be admired, but it is one vast, complex entity that offers a range of natural resources for their use, for their economic and social growth and to meet their material and spiritual aspirations.

In a country like India, with a high population density and high level of poverty, virtually every ecological niche is occupied by some occupational or cultural human group for its sustenance. Each time an ecological niche is degraded or its resources appropriated by the more powerful in society, the deprived, weaker sections become further impoverished. For instance, the steady destruction of our natural forests, pasture lands and inland and coastal water bodies has not only meant increased economic poverty for millions of tribals, nomads and traditional fisherfolk, but also a slow cultural and social death: a dismal change from rugged self-sufficient human beings to abjectly dependent landless labourers and squalor-stricken urban migrants. Current development can, in fact, be described as the process by which the rich and more powerful reallocate the nation's natural resources in their favour and modern technology is the tool that subserves this process.

The resource-use pattern initiated by the current development process is, thus, not just attacking and destroying the environment — the wildlife, forests and fisheries, for instance — but also the vast majority of human beings, especially the poor, and their cultures. A development process that does not care for human life cannot care for the human environment or vice-versa. The world's cultural diversity is no historical accident. It springs from the world's biological diversity. And today both stand equally threatened. With each passing day, both the physical shape and the cultural milieu of Bombay nudges closer to New York.

The product-use pattern encouraged by the current development process is such that it is separating people from their immediate environment: the artificial has become the more desirable, the imported environmental misfit has become the more appropriate. This has gone to the ridiculous extent that even such an intimate biological behaviour as breastfeeding is being disrupted by commercial propaganda and mothers, in increasing numbers, are becoming dependent on a supply of multinational milk power, which is lethal when mixed with polluted water.

As an aggressively high-consumption oriented culture intensifies amongst a well-to-do minority across the world, it is creating a rat race amongst the rest, both between and within nations, to become a part of it. The desire to join this growing, multinational culture is so strong that for most people it has left no freedom to choose. The individual has no alternative.

Our growing capabilities in science and technology have helped us to acquire a technological literacy that allows us to converse with the rest of the world as equals and has rightly earned us international prestige amongst the community of nations. But science and technology cannot be allowed to impose their own value system on society. On the contrary, the use of science and technology in society has to the governed by a human, socially appropriate value system. Otherwise we will get a rampant materialism, the extreme symbol of which is the young man amongst us who does not even mind burning his bride if he does not get the promised scooter and refrigerator in dowry.

The culture exported from the so-called developed countries, which we are adopting unthinkingly is at the heart of the crisis. We never ask the question : developing towards what ? This growing multinational culture must be destroyed because it leads to economic chaos, increased social disparities, mass poverty and filthy affluence in coexistence, environmental degradation, and ultimately civil strife and war.

To get a balanced, rational development and to preserve the environment, a new development process is needed. The biggest intellectual and political challenge of our times is to articulate and demonstrate this new kind of development.

It is a reflection of our prevalent culture that development has come to mean a mere increase in consumption and production of material goods and services. Development is not a product that can be obtained with economic growth. On the contrary, it is a process which enables all levels of society — individual, community and nation — to become more self-reliant and more independent in choosing and deciding their own future.

Building up self-reliance at the level of the community, without which self-reliance at the level of nation is, illusory, is not possible without the restoration of human beings, relationships with their immediate environment, and this will require an enormous change in current education, production and product-use patterns, and management and governance of environmental systems and public services. Participatory management, for instance, will be essential. Health, forestry and energy experts all over the world now realise that neither the delivery of basic health services to control the daily epidemic of diarrhoea nor the establishment of community woodlots to increase the supply of cooking energy is possible without community participation. Multinational chemicals are less important for the health problems of developing countries than immediate environmental sanitation, the immediate local herbal wealth and care and development of the immediate agricultural resources to provide adequate nutrition.

Women invariably suffer more from unbalanced development and environmental degradation. As our understanding of both feminist and environmental concerns grows, we find that women are more interested in the restoration of the environment, which provides the family with its basic needs, than their cash-hungry men. Especially within families where basic needs are gathered, it is women who are left to fend for the family. The new development process will demand that women and men share equal power in society.

Thus, an environmentally enlightened development process necessarily demands a new culture, which will be :

- egalitarian, with reduced disparities between rich and poor and power equally shared by men and women;
- resource-sharing;
- participatory;
- frugal, when compared to the current consumption patterns of the rich;
- humble, with a respect for the multiplicity of the world's cultures and lifestyles; and,
- it will aim at greater self-reliance at all levels of society.

The environmental crisis, born out of a global maldevelopment, affects all countries of the world, North or South, East or West. But no country can wait for the rest of the world to find a solution. In India, particularly, the problems are too pressing. We strongly believe that a sustainable egalitarian development is possible if we keep in mind what Mahatma Gandhi once said : There is enough in the world for everyone's need but not enough for everyone's greed. ■

BOOK REVIEWS

FORCED OPTIONS — SOCIAL DECISIONS FOR THE 21ST CENTURY

by Roger Lincoln Shinn, Harper and Row, San Francisco, 1982; 267 pp.

There is a law of cosmic laziness called the "principle of least action". This book is irrefutable evidence, if that were needed that Roger Shinn is not guilty of "cosmic laziness" as Bertrand Russell called the gravitational tendency of a body when moving "from one place to another (to) choose the route involving least work". The "big problems" he addresses as the critical "social decisions for the 21st century" — the sub-title of his book — are the energy emergency, hunger, population, limits of growth, genetic manipulation and war. So much has been written about them recently, as his footnote and bibliography make evident, that it might be thought little could be added to the debates surrounding them.

Forced Options, however, especially for Christians willing to do some hard thinking about such matters and not succumb to "cosmic laziness" does — and impressively — by its originality and, considering its modest size, comprehensive scope. His decisive logical criterion, "forced options", is drawn from William James and it defines the issues identified as well as reinforces the ethical urgency surrounding the ecological emergencies of today and tomorrow for which, as he says, "conventional wisdom (is) inadequate to the complexity of the situation".

Ecumenically the book is of particular significance since it reflects Roger Shinn's long and intimate involvement with the work of the WCC, especially through the programmes of Church and Society. Though his arguments are based on rigorous philosophical and theological fundamentals, he is not the detached academic theorizing from Morningside Heights. Here is existential struggling with life and death problems within the international ecumenical community. He pays tribute to the "mixture of professional perspective, ideologies and national experiences" at such WCC gatherings as the MIT Conference in 1979 which helped shape this important book, and speaks as one of many who "owe much to the people who have impressed on me, year by year, the international aspects of human problems". ■

Review by Keith Bridston

THE LIBERATION OF LIFE: FROM THE CELL TO THE COMMUNITY

by Charles Birch and John B. Cobb, Cambridge University Press.

The Liberation of Life discusses liberation both from mechanistic science and from the social-economic-technological practices that threaten civilization with disaster. Birch and Cobb believe that the two kinds of liberation are closely related.

The book is likely to become a classic in the literature of process philosophy and theology. The authors are steeped in the tradition of Alfred North Whitehead and, by avoiding some of his esoteric terminology, make his thought accessible to people who wouldn't otherwise make the considerable effort necessary to comprehend it. In addition, Birch and Cobb engage process thinking with problems that are now far more conspicuous and urgent than they were in Whitehead's time.

The basis of the book's argument is that ecological relationships are important to the nature of molecules, living cells and species of life. Something of the initiative and purpose experienced by human life is real for all animals and plants, and even for atoms and molecules. All these "events" act in relationships with their environments. In a continuous dialogue with Jacques Monod, the writers maintain that his "chance and necessity" constantly interact with purpose (or protopurpose) in nature. This affirmation leads to a faith in "Life" — the creative basis of all life. And they find this Life far closer to the biblical God than is the immutable God of most classical theology.

This faith leads to a sensitive and comprehensive ethic in which all things — above all, personal life — have both intrinsic and instrumental value. It is an ethic of "trust and service", an ethic which — in its emphasis on relationships — rejects all absolutes, unless it be the final criterion and goal of the enhancement of "richness of experience". It seeks a just and sustainable society, in which justice and sustainability support each other. (As one example, the writers see the liberation of women as a prerequisite to solution of the population problem.) They call for an economic order that will radically transform both capitalism and socialism, with their ecological destructiveness.

To call this a superb book is not to say that I am totally persuaded by it. On many arguments of detail a different selection of evidence — yes, these writers select their evidence, just as you and I do — would lead to different conclusions. But more important are two big issues.

First, the authors, while emphasizing the need for both "spiritual" change and social reconstruction, deliberately slight the "political problems" inherent in their proposals. They prefer to put their trust in "a silent working of Life in the hearts of men and women." Their own insights could equally well lead them to accent the ways in which political macrostructures influence the "hearts" of people.

Second, their total vision embodies a major perplexity. In an entropic universe (a universe moving inexorably to dispersion of energy and disorganization, according to the Second Law of Thermodynamics) the "fragile" forces of life work "against the tendency of all things, when left to themselves, to decay." Hence to "trust Life", to "assume that it is a cosmic principle", is a radical leap of faith, precariously supported by the opinion that Life is probably at work elsewhere in the universe. For myself, I find "the silence of these infinite spaces" (Pascal) a little more cozy because there may be life on other solar systems, but I don't want to base a theological conviction on so insecure a probability. Birch and Cobb, by moving from their scientific chapters to their theological-ethical chapters, seem to build a natural theology on the findings of science. Actually, at the crucial point of their metaphysical argument, they candidly grant that "scientific knowledge" is little help and that they must make the "religious" choice to "trust Life".

My own world is more mixed up, more turbulent than theirs, and I have more trouble bringing my affirmations into a coherent system. But I admire those who make the effort with the sensitivity and honesty of Birch and Cobb. ■

From a Review by Roger L. Shinn in the "Christian Century".